ABSTRACT BOOK

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EVER PAST PRESIDENT LECTURE

1412

EVER Past President lecture: Lessons from the Fascinating World of Bestrophinopathies

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Division of Ophthalmology & Center for Cellular & Molecular Therapeutics, The Children's Hospital of Philadelphia, Philadelphia

Summary

Purpose: To describe the genotypes and phenotypes in patients with bestrophinopathies. Methods: Examples of Best vitelliform macular dystrophy will be compared with the phenotype of patients with autosomal recessive bestrophinopathy and autosomal dominant vitreoretinochoroidopathy. Results: Phenotypes of BVMD range from asymptomatic, normal fundi in heterozygous BEST1 mutation carriers, to classic macular egg yolk-like lesions. Biallelic BEST1 mutations cause ARB, characterized by shallow retinal detachments in the posterior pole, with hyperautofluorescent deposits in the watershed zone and superonasal to the optic disc. In addition, there are small, inner retinal, cystoid changes. Rod-cone dystrophy (RCD) develops later. Subacute angle closure glaucoma is frequent. ADVIRC patients show a 360° peripheral hyperpigmented band, peripapillary staphylomata, RCD and microcornea. Unique mutations in one BEST1 allele cause ADVIRC. Electro-oculography is abnormal in all bestrophinopathies first. Conclusions: Bestrophinopathies are a diverse group of conditions caused by either mono- or biallelic mutations in BEST1. Whereas ADVIRC is very different, BVMD and ARB show considerable overlap. This suggests that a threshold of bestrophin protein production, blurring the differences between dominant or recessive mechanisms of disease, may be the main determinant of the phenotype. Abnormal EOGs indicate primary RPE involvement.

1711

Developing new treatments for inherited retinal degenerations

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Summary

Retinal diseases are currently the leading causes of untreatable blindness in Europe. Most commonly, incurable blindness occurs when photoreceptors are lost and therapeutic strategies therefore aim to prevent photoreceptor cell death by genetic correction of single gene disorders. Once photoreceptors have degenerated, alternative strategies are required to regenerate the retina using biological approaches and subretinal electronic devices have also shown great promise in demonstrating that blindness may be potentially reversible. This lecture will provide an update on the application of scientific discovery in clinical trials for retinal degeneration and provide insight into the fascinating age of discovery that lies ahead.

2511
Medical Science and Clinical Research in Corneal Regenerative Medicine

Shigeru KINOSHITA
Department of Frontier Medical Science and Technology for Ophthalmology, Kyoto Prefectural University of Medicine, Kyoto, Japan

Summary

It is important for clinician scientists to acquire the advanced knowledge and novel technology needed to create completely new areas of translational research, ultimately aimed at application in the clinical setting. For instance, devastating ocular surface disorders such as Stevens-Johnson syndrome are very difficult to treat properly. Today, thanks to recent advancements in corneal biology and immunology, the state-of-the-art corneal regenerative medicine such as autologous cultivated oral mucosal epithelial transplantation is applied to treat and, in general, well restore ocular surfaces devastated by disease. A similar type of translational research, based on the basic understanding and clinical application of corneal endothelial cell biology, is being used to develop the novel therapy of 'cultured corneal endothelial cell injection' into the anterior chamber for corneal endothelial dysfunction such as Fuchs endothelial corneal dystrophy. For this purpose, non-proliferative corneal endothelial cells from donated corneas can be induced to proliferate, without inducing cell state transition (CST). In clinical research started in December 2013, all the cases performed this procedure have already shown promising results. It is our hope that ophthalmology-related translational research, such as that described above, will receive official governmental approval based on accumulated data of the safety and efficacy of the procedures.

3211

OPA1 gene and mitochondrial optic neuropathy: disease mechanisms and potential therapies

Marcela VOTRUBA
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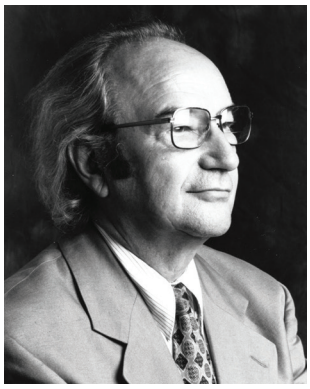
Summary

Primary inherited optic neuropathies are a group of blinding genetic disorders in which optic atrophy secondary to loss of retinal ganglion cells is a key clinical feature. The commonest causes world-wide are mutation in mitochondrial DNA (causing Leber's Hereditary Optic Neuropathy) and mutation in the nuclear gene, OPA1 (causing Autosomal Dominant Optic Atrophy: ADOA). 60-75% of patients with autosomal dominant optic atrophy have mutations in the OPA1 gene. The OPA1 protein is targeted to the mitochondria and is involved in regulation of mitochondrial fusion. A better understanding of mitochondrial function, including dynamics, is revealing that functional and structural changes in mitochondrial morphology are important factors in diseases of ageing in the eye and visual system. Key proteins have been discovered which control the balance of mitochondrial fusion and fission and have a range of other functions, such as controlling maintenance of mitochondrial DNA, cell death, autophagy, mitochondrial metabolism and redox signalling. A decline in mitochondrial function plays a role in the ageing process and increases the incidence of age-related disorders. Mitochondrial optic neuropathies are 'orphan' diseases but with the advent of recent trials of novel therapies in patients with the mitochondrial optic neuropathy, Leber's hereditary optic neuropathy, there is the first glimmer of hope for the treatment of this group of patients.

EUROPEAN OPHTHALMOLOGY HERITAGE LECTURE

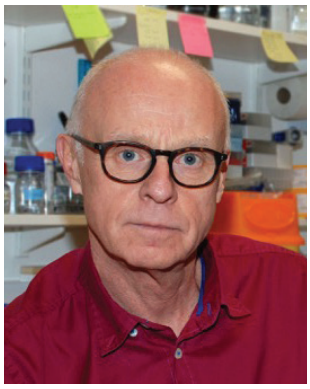


1611
Magnificat

Luc Missotten
University Hospital Leuven, Dept. Ophthalmology, Leuven, Belgium

Summary

We will present some evidence showing that the use of a magnifying glass started in Greece in the fifth century BC.



Acta Ophthalmologica

2211

The pathogenic role of LRG1 in ocular neovascularisation: From discovery to targeted therapy

John GREENWOOD
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Summary

We have reported that the secreted glycoprotein, leucine-rich alpha-2-glycoprotein 1 (LRG1), promotes neovascularisation in various models of ocular disease (Wang et al., Nature 2014; 499: 306-311). LRG1 is up-regulated in many disease conditions and mediates its pro-angiogenic effect by modifying the TGFß signalling network. Loss of LRG1, or blocking its biological activity, results in attenuation of neovascular complications in the rodent models of laser-induced choroidal neovascularisation and oxygen-induced retinopathy. Recently, we have observed that loss of LRG1 results in vessel normalisation, suggesting that in the pathological setting LRG1 corrupts the normal physiological angiogenic process. Early indications suggest that LRG1 interferes with vascular recruitment of pericytes resulting in failure of vessel maturation. These findings have important implications in diseases such as diabetic retinopathy where there is a need to promote a normal functioning vasculature. Consistent with the concept of LRG1 causing vascular dysfunction, we have additionally observed that loss of LRG1 reduces vascular permeability in ocular inflammation. Together these findings have led us to develop a humanised blocking antibody that will be taken into clinical trials for the treatment of wet age-related macular degeneration. In this seminar I will present our work on LRG1 in ocular disease and describe the development of an anti-LRG1 therapeutic for clinical use.

Ophthalmic Research
Journal for Research in Experimental and Clinical Ophthalmology

The cataract surgeon and the anterior interface

Marie-José TASSIGNON
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Summary
Performing a posterior capsulorhexis on a routine basis related to the implantation of the bag-in-the-lens IOL has opened new frontiers in helping understanding the Berger space and its relation with the vitreous. It is only recent that this space could be observed life during surgery thanks to new OCT devices. This observation may open new understandings on the pathogenesis of vitreo-retinal complications after cataract surgery.

EVER 2016
Wednesday, Oct 5

• 1111

Role of Glial Cells in Regulating Retinal Blood Flow during Flicker-Induced Hyperemia and Systemic Hyperoxia-Induced Hyporemia in Cats

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Background. To investigate the role of glial cells in the regulation of retinal circulation in response to flicker stimulation, which is related to neurovascular coupling, and systemic hyperoxia in the retina.
Methods. Using laser Doppler velocimetry, we measured the retinal blood flow (RBF) in first-order retinal arterioles in anesthetized cats. After intravitreal injection of L-2-aminoadipic acid (LAA) as gliotoxic compound, we examined the changes in RBF in response to flicker stimulation of 16 Hz for 3 minutes and systemic hyperoxia induced by the inhalation of 100% oxygen for 10 minutes.
Results. The RBF increased gradually and reached a maximal level after 2 to 3 minutes of flicker stimuli in the PBS group. In the LAA-treated eyes, the increases in RBF during the flicker stimulation were significantly attenuated by one third of those in the control eyes. During hyperoxia, the decreases in RBF in response to hyperoxia were significantly attenuated in the LAA-treated eyes compared with the control.
Conclusions. The current results suggest that the retinal glial cells play an important role in the regulation of retinal blood flow during Flicker-Induced Hyperemia and Systemic Hyperoxia-Induced Hyporemia.

• 1112

Retinal Oximetry and Blood Flow

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The retina has highest metabolic demand compared to any other tissue in the human body and regulation of the retinal blood flow, blood oxygen saturation (SO2) and thereby oxygen delivery (DO2) are crucial to preserve vision and function. The study reports inner retinal DO2 and consumption (VO2) during controlled and stable normoxia, hyperoxia and hypoxia in humans. Eleven subjects underwent measurement of total retinal blood flow (TRBF) and retinal blood oxygen saturation (SO2) using prototype methodologies of Doppler Spectral Domain Optical Coherence Tomography and Metabolic Hyperspectral Camera, respectively. TRBF decreased significantly (p=0.010) from 43.17 µL/min (+12.7) to 36.23 µL/min (+4.6) during hyperoxia, conversely, TRBF increased significantly (p< 0.008) to 52.89 µL/min (+10.9) from baseline during hypoxia. The average inner retinal O2 delivery during normoxia was 8.48 mLO2/100g/min and inner retinal consumption was 3.64 mLO2/100g/min and these values changed during provocation to maintain a stable DO2 and VO2. Change in TRBF and SO2 reflect metabolic autoregulatory function of the retinal tissue indicating that retinal blood flow and SO2 are able to precisely compensate for changes in inspired oxygen.

Conflict of interest
Any Stocks or shares held by you or an immediate relative:
Professor Hudson is a shareholder in Thornhill Research Inc, Toronto, Canada, the company that manufactures the gas sequencer used to provoke systemic hyperoxia and hypoxia,
Any research or educational support conditional or unconditional provided to you or your department in the past or present:
Professor Hudson has recieved research supoort from Optina Inc, Montreal, Canada, the company that manufactured the prototype hyperspectral retinal camera.

• 1113

OCT angiography: evaluation of the macular perfusion

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OCT angiography (OCT-A) as a new non-invasive imaging technology that enables the monitoring of the macular circulation. OCT-A has a better rate of detection either of the macular capillaries plexus or the distribution of the macular cystoid spaces, than using fluoserseine angiography (FA), allowing the evaluation, of either superficial or deep perifoveal capillary layers.
During the evolution of the ischemic micro-angiopathies, the appearance of the capillaries ischemic areas, the micro-aneurysms, the capillaries segments dilations as well as the distributions and the evolution of the capillaries collaterals, can be monitored. The evaluation of the deep capillary plexus, appears to be more severely affected than the superficial capillary plexus, resulting to deep non perfused capillaries areas. The perifoveal capillary arcade disruption, observed on OCT-A in eyes with retinal vein occlusions, was correlated with the presence of retinal peripheral ischemia.
OCT-A progressively became a useful imaging modality in the evaluation and management of macular hemodynamic changes observed during the evolution of the retinal ischemic micro-angiopathies allowing to evaluate the treatment effects on the capillary circulation.

• 1114

Retinal Oxygen Extraction

WERKMEISTER R *(1), Aschinger G (1), Linsenmeier R (2), Schmetterer L (1)*
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(2) Northwestern University, Department of Ophthalmology, Chicago, United States

Adequatefunctionoftheretinaisdependentonproperoxygensupply.Anumberofcommon sources of blindness go hand in hand with abnormalities in perfusion and alterations in oxygenation. In humans, the inner retina is oxygenated via the retinal circulation. In this talk, a method to calculate total retinal oxygen extraction based on measurement of total retinal blood flow using dual-beam bidirectional Doppler OCT and measurement of oxygen saturation by spectrophotometry is presented. Eight healthy subjects were included in the study and breathed ambient room air and 100 percent, respectively, while perfusion and oxygenation parameters were measured. Total retinal blood flow was 44.3 ± 9.0 µl/min during baseline and decreased to 18.7 ± 4.2 µl/min during 100% oxygen breathing. A pronounced decrease in retinal oxygen extraction from 2.33 ± 0.51 µl(O2)/min to 0.88 ± 0.14 µl(O2)/min during breathing of 100% oxygen was calculated.The introduced approach that allows measuring retinal oxygen extraction in humans, may have considerable potential for diagnosis, and risk stratification treatment monitoring in patients with retinal vascular disease.

• 1115

The oxygen saturation in retinal arterioles is predictive for the effect of intravitreal anti-VEGF treatment on diabetic macular edema

BEK T

Arhus University Hospital, Ophthalmology, Århus C, Denmark

It has been shown that the oxygen saturation in retinal vessels is increased in patients with diabetic maculopathy, but the role of this parameter for the effect of anti-VEGF treatment of the disease is unknown. Therefore, the predictive value of oxygen saturation in larger retinal vessels for the effect of anti-VEGF treatment of diabetic maculopathy was studied. In 73 eyes from 53 patients with center involving diabetic macular edema the predictive value of oxygen saturation in larger retinal vessels and other risk factors for retinopathy progression as explanatory variables was studied for visual acuity (VA) and central retinal thickness (CRT) after anti-VEGF treatment as effect variables.Anti-VEGF treatment induced a significant increase in VA and a signficant decrease in CRT, but no significant changes in the overall oxygen saturation of larger retinal vessels. In a multiple regression model VA and CRT obtained before treatment contributed significantly to predicting the effect of treatment on the same variable. Mean arterial blood pressure and the oxygen saturation in retinal arterioles before treatment contributed signficantly to predicting both VA and CRT after treatment.The oxygen saturation in retinal arterioles is a new parameter that might potentially be included in risk models predicting the effect of anti-VEGF treatment on diabetic maculopathy.

• 1121
The tests

THOMPSON D
Great Ormond Street Hospital for Children, London, United Kingdom

Visual electrophysiology tests provide objective information about visual pathway function. They characterise 'bio-electrical' changes in the retina and visual pathway to the striate cortex. The International Society for Clinical Visual Electrophysiology of Vision, [ISCEV], publishes standards and guidance for performing each test; download from www.ISCEV.com. There are five. The electro-oculogram, **EOG**, indicates RPE physiology. A full field flash electroretinogram, **ffERG**, summates activity from the whole retina and distinguishes photoreceptor and inner retinal function. The pattern ERG, **PERG**, is a localised retina response produced by an alternating black and white checkerboard. The PERG has two components which may be used to measure macular function and retinal ganglion cell function. Multifocal patterns stimulate even smaller localised regions of retina and the resulting **mfERG** may depict the geographic extent of macular or cone dysfunction. The visual evoked potential, **VEP**, reflects changes in the striate cortex produced by flashes or patterns and distinguishes optic nerve, chiasmal and post chiasmal pathway function. This talk will describe the patient's perspective, what the results look like and how they are analysed.

• 1122
The indications

SMITH R
Buckinghamshire Healthcare NHS Trust, Ophthalmology, Aylesbury, United Kingdom

a. What signs and symptoms prompt test request?
b. Which test do I request?
c. What information should I give on the referral letter?

Visual electrophysiology tests are often requested as part of a clinical work-up of patients with suspected retinal or optic nerve disease, or unexplained visual symptoms. Occasionally, tests will provide an immediate and unequivocal diagnosis, but more often, the results of tests must be interpreted in the context of the patient's clinical history, examination findings and the results of other investigations. This talk will show how requesting clinicians and the electrophysiology lab can work together to obtain the maximum clinical value from visual electrophysiology tests.

• 1123
Retinal tests

ROBSON A
Moorfields Eye Hospital, London, United Kingdom

Visual symptoms are often non-specific and fundus signs such as disc pallor can result from retinopathy or optic neuropathy. Retinal and macular pathologies may not be evident on clinical examination and visual electrophysiology provides an objective method of localising dysfunction along the visual pathway. This presentation will focus on the assessment of macular function using pattern and multifocal electroretinography (PERG; MfERG) and on the characterisation of retinal function using full-field electroretinography (ERG). The comparison of PERG or MfERG with ERG allows differentiation between macular and generalised retinal dysfunction. Pattern ERG may also be used to assess retinal ganglion cell function and complements cortical visual evoked potential (VEP) assessment of optic nerve and post-retinal function. Objective assessment of macular function (PERG/MfERG) is usually essential to exclude a macular cause of VEP abnormality and normal retinal electrophysiology may prompt the need for additional VEP testing or neuroradiology. The use of these techniques will be highlighted using illustrative cases.

• 1124
Visual Evoked Potentials

LIASIS A
Great Ormond Street Hospital for Children, Ophthalmology, London, United Kingdom

VEPs in neuro-ophthalmology are important for diagnosis and surveillance of intracranial pathology. The VEP can indicate the impact of pathology along the afferent visual pathway to the striate cortex. The pathology may directly or indirectly affect the visual pathway. A VEP typically is largest and best defined on electrodes over the mid occiput. The VEP to pattern reversal stimulation has a main positive peak, p100. The latencyp100 has been used extensively in adult neurology to depict and monitor conduction delay consequent upon demyelination and optic neuritis associated with MS. The other characteristics of the VEP waveform are also informative including its size, shape and distribution over the occiput. An inter-ocular comparison of the distribution of monocular VEPs over the occiput can signpost chiasmal dysfunction, e.g. compression, or chiasmal disproportion as seen in albinism or achiasmia, or indicate hemisphere dysfunction.
This talk will describe what a patient experiences during a VEP, what the results look like and how they are analysed.

• 1125

In the neuro-ophthalmology clinic

SMITH R
Buckinghamshire Healthcare NHS Trust, Ophthalmology, Aylesbury, United Kingdom

a. Clinical case discussions: presentation of clinical cases and application of visual electrophysiology test.
A number of clinical cases where visual electrophysiology tests played an important part in the diagnosis or management of patients in the neuro-ophthalmology clinic will be discussed.

• 1131

Pathophysiology of uveitis

DICK A
University of Bristol, Bristol Eye Hospital, Bristol, United Kingdom

This talk will overview the pathophysiology of non-infectious uveitis in relation to recent SUN (standardised uveitis nomenclature) disease classification.The experimental and translational human evidence of autoimmunity and activation of immunity will be discussed. In addition the talk will highlight the pathways and mechanisms of tissue damage that results in sight-threatening disease.Traditionally, despite active immune regulatory mechanisms operative within the ocular environment, inflammation still occurs. Activated antigen and non-antigen specific T cells are generated in uveitis. The interplay with innate immunity and in particular cells of myeloid lineage both systemically and within the local environment dictate the severity and extent of pathology we observe. The understanding of immune responses during the uveitis open many avenues to potential novel immunotherapies that not only suppress inflammation but attempt to redress immune balance, tolerance and local homeostasis within ocular tissues.

• 1132

Classification of uveitis

ANDROUDI S
University of Thessaly, Department of Ophthalmology, Thessaloniki, Greece

Classification and standardization of uveitis is important, as it enhances the precision and comparability of clinical research from different centers and assists in the development of a complete picture of the course of the disorders and their response to treatment. Uveitis may be classified in a number of ways, according to several systems and multiple descriptors. The uveitis classification includes anterior uveitis (iritis, iridocyclitis, and anterior cyclitis), intermediate uveitis (pars planitis, posterior cyclitis, and hyalitis), posterior uveitis (focal, multifocal, or diffuse choroiditis, chorioretinitis, retinitis, and neuroretinitis) or panuveitis (anterior chamber, vitreous, retina, and choroid).Today's uveitis nomenclature has been revised regarding the anatomical location and the grade of inflammation, and supplemented by the inclusion of definitions for onset, duration and course. While helpful for clinical practice and clinical trials, further work still needs to be carried out concentrating on validated clinical assessment tools for activity and damage for common, specific uveitic entities.

• 1133

Signs and symptoms of uveitis

NERI P, Bisceglia P, Cesari C, Carrozzi G, Pirani V
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Uveitis can be a sight-threatening disease. Inflammation of uveal tract can be divided into: anterior, intermediate, posterior, and panuveitis. Blurred vision, ocular pain, photophobia and floaters are some of the symptoms complained by those who are affected by uveitis. The onset of uveitis can be either acute or insidious, bilateral rather than unilateral. Posterior uveitis is usually associated with vitritis. Anterior chamber cells and flare should be graded according to standardized uveitis nomenclature (SUN) working group. Binocular indirect ophthalmoscopy (BIO) score is used to evaluate the severity of vitritis. Vitreous changes may comprehend: vitreous hemorrhage, vitreous strands, and vitreous traction. A further classification of posterior uveitis depends on the primary site of inflammation, which can identify: retinitis, choroiditis, retinochoroiditis, and chorioretinitis. Posterior pole uveal involvement can be: focal, multifocal, and placoid. Retinal vasculitis can be present. Uveitis might be complicated by anterior and posterior synechiae, which can lead to uveitic glaucoma, cystoid macular oedema, retinal and choroidal neovascularizations, and retinal ischemia.

• 1134

Laboratory work-up and specialized investigations

PLEYER U
Charite- Campus Virchow, Augenklinik, Berlin, Germany

Based on the anatomical involvement of the eye intraocular inflammation is classified into anterior, intermediate, posterior and panuveitis. All subtypes of uveitis are potentially related to infectious and noninfectious etiologies.
This presentation will assist the participants in accurately diagnosing uveitis in a step latter approach including physical and laboratory investigations.
In addition, a tailored approach based on confounding clinical observations with specialized investigations will help to further differentiate clinical entities. In cases of suspected intraocular infections the option of intraocular fluid evaluation for antibody testing and polymerase chain testing against the causative agent will be presented. Taken together, this part of the course will provide a rational decision-making strategy for diagnosis of patients with uveitis.

• 1135

Imaging in uveitis : techniques and indications

HERBORT C P

University of Lausanne & Centre for Ophthalmic Specialised Care, Ophthalmology, Lausanne, Switzerland

Uveitis has become a precise clinical science, in part thanks to the development of performing imaging methods. Laser flare photometry (LFP), although not an imaging method "stricto sensu", measures back-scattered photons from the anterior chamber produced by a laser beam and so establishes the exact level of intraocular inflammation at any time and allows precise monitoring of uveitis. Fluorescein angiography (FA) has been used for more than 50 years and gives indications on inflammation of superficial structures of the fundus, optic disc and the retinal pigment epithelium. Indocyanine green angiography (ICGA) became available in the early 1990ties and is essential in the precise investigation of the inflammatory, otherwise occult reaction in the choroidal compartment, giving panfundal information that is otherwise not available. Optical coherence tomography (OCT) analyses both the retina and choroid (in the enhanced depth mode - EDI) of the posterior pole. Ultrasound biomicroscopy (UBM) is useful to analyse inflammation in the retroiridal space. Other imaging methods such as fundus autofluorescence (FAF) or Angio-OCT are still being evaluated for their utility in uveitis.

• 1136

Therapeutic management of uveitis

DICK A

University of Bristol, Bristol Eye Hospital, Bristol, United Kingdom

This talk will overview the contemporary therapeutic approaches to treatment of noninfectious non-infective ocular inflammatory disease. Treatment of non-infectious uveitis has over past 15 years expanded from the use of traditional therapies including corticosteroids and immunosuppressants to the deployment of targetting the immuneresponse with biologic therapies with monoclonal antibodies and immunoadhesins. Such use will be exemplified with case reports during the talk. Evidence of efficacy of immunosuppressants in the treatment of uveitis, the role of predicting steroid responsiveness, the use of monotherapy with immunosuppression and finally the pathways and evidence of success of biologic therapy will be provided.

• 1141

Immunosuppression with a subconjunctival implant releasing dexamethasone in a rabbit model of penetrating keratoplasty

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(2) University Hospital, Department of Pharmacology and toxicology, Saint Etienne, France
(3) University Hospital, Department of Pathology, Saint Etienne, France

Purpose Rejection occurs in 20-30% of cases after penetrating keratoplasty (PK). Most often, its prevention relies only on steroid eyedrops but topical treatments expose to limited therapeutic adherence. Aim: to assess efficacy of continuous immunosuppression using a subconjunctival implant releasing dexamethasone (SCIRD) in a rabbit model of PK.
Methods 7.5mm PK were performed in NZW rabbits. After randomisation they received either a SCIRD (Ozurdex, Allergan) (n=8), dexamethasone eyedrops (1mg/mL, Dexafree, Thea) 3 times a day (n=6), or 0.9% NaCl (n=6). The running suture was left in place to stimulate angiogenesis. Weekly follow-up by digital slit lamp and anterior segment OCT. Images were analysed blind to the treatment for transparency, neovessels, and central corneal thickness (CCT). After 5 or 6 weeks, animals were killed and corneas were processed for standard histology.
Results Placebo group: constant early neovascularization growing to neovessels penetrating the graft on >270° after 5 weeks + rejection (opaque graft, 360° neovessels, CCT > 500µm) in 50% of cases. Eye drops and implants groups: similar evolution, without rejection after 6 weeks and normal CCT. Moderate neovascularization occurred in 5/6 rabbits treated with eyedrops and 6/8 treated with the implant. Histology confirmed clinical diagnosis in all cases. The implants disappeared after 3 to 5 weeks. No adverse effect.
Conclusions Despite a severe rejection model, a SCIRD was not less efficient than eye drops to prevent rejection during the first 6 weeks. These findings highlight the potential benefit of subconjunctival implants of steroids after corneal graft.

• 1142

Infectious keratitis after penetrating keratoplasty: predisposing risk factors and prognosis

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Hedi Rais Institute of Ophtalmology, Service B, Tunis, Tunisia

Purpose to investigate prevalence, predisposing risk factors and prognosis of graft survival in patients who developed infectious keratitis following penetrating keratoplasty (PK).
Methods we undertook a retrospective analysis of 16 patients hospitalized at the Institute of Ophthalmology of Tunis for the occurrence of infectious keratitis following PK over an seven-year period (From March 2009 to March 2016). We excluded all herpetic keratitis secondary to PK. Efficacy of treatment was evaluated by anatomical (clarity of graft) and visual recovery.
Results Principal indications for PK were corneal opacity (secondary to infectious keratitis in 2 cases and to trachoma in 2 cases), therapeutic penetrating keratoplasty for corneal perforation in 5 cases, keratoconus in 3 cases, pseudophakic bullous keratopathy in one case and penetrating keratoplasty in children in 3 cases. Principal predisposing risk factors were suture-related problems (56,25%) followed by topical corticotherapy (43,75%) and persistant epithelial defect in (43,75%). The microbiological examinations were positive in 70,58 % of the cases: bacillus Gram +: 66,66%, Bacillus Gram Négatif: 8,33%, amoeba: 8,33% of the cases. We noted two cases of polymicrobial infection. Four patients underwent PK. The infection was solved in 100 % of the cases but with opacities of the transplant in 75% and a severe limitation of the visual acuity.
Conclusions The development of infectious keratitis after PK is a serious complication that is associated with a high incidence of graft failure and poor visual outcome. Preventive measures are essential and include a regular follow-up and education of the operated patients.

• 1143

Mid-term clinical outcomes of collagen-phosphorylcholine cornea substitutes for therapeutic anterior lamellar keratoplasty

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(2) Linköping University, Institute of Clinical and Experimental Medicine, Linköping, Sweden

Purpose To assess safety and efficacy of biosynthetic collagen-phosphorylcholine implants as corneal substitutes in patients with severe pathologies for whom human donor cornea transplantation carries a high risk of rejection.
Methods Recombinant human collagen type III and 2-methacryloyloxyethyl-phosphorylcholine were fabricated into collagen-MPC corneal substitutes (CMCS). CMCS were implanted into the corneas of 8 patients (3 Phase 0 , 5 Phase 1 patients) by anterior lamellar keratoplasty (ALK). The pathologic areas were excised and replaced with CMCS grafts. Benchmark patients were grafted by conventional ALK and human amniotic membrane (HAM). Follow-up ranged from 12 to 36 months.
Results Pre-operatively, CMCS patients had persistent ulcers or recurrent erosions from chemical or thermal burns, keratitis or failed penetrating grafts. All patients were relieved of pain and photophobia post-operation. 7/8 CMCS grafted corneas epithelialized within 4-50 weeks leading to improved visual acuity in 4/8 patients. Neovascularisation developed in 2/8 patents. Ten patients with similar conditions grafted by conventional ALK took 2-12 weeks to epithelialize. Neovascularisation developed in 9/10 patients, and visual acuity improved in 3/10 patients. In HAM patients, corneas epithelialized within 2-3 weeks, neovascularization developed in 7/10 patients, vision improved in 4/10 patients.
Conclusions These results suggest that CMCS are safe in patients. In addition, they appeared to withstand the adverse microenvironment within corneas with severe pathology, and restored corneal integrity in high risk keratoplasty patients. Further clinical testing is needed to verify these early results.

• 1144

Chondro-keratoprosthesis: an alternative to OOKP ?

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(2)Aix Marseille University, Maxillofacial surgery, Marseille, France

Purpose To evaluate the use of cartilage as a potential graft material in order to explore a new approach toward osteo-odontal tissue replacement in keratoprosthesis surgery
Methods We describe a modification of the osteo-odonto-keratoprosthesis that involves the use of autogenous auricular conchal cartilage graft (ACCG) in 2 patients. In stage 1, ACCG was harvested via a posterior approach. Then, an optical polymethyl-methacrylate cylinder was embedded into a double-layered fragment of the conchal cartilage and secured by cyanoacrylate glue. The optical cylinder and cartilage complex were then implanted into the cheek. The stage 2, performed 2 to 4 months later, involved retrieval of the complex and implantation into the cornea, after reflection of the buccal mucosal flap, corneal trephination, iris and lens removal, and anterior vitrectomy. Cartilage specimens were then processed for histological evaluation after retrieval.
Results We report 2 cases of chondro-keratoprosthesis (CKPRO) who underwent surgery with a 9 months follow-up following a bilateral limbal stem cell deficiency associated with severe corneal changes. On patient 1, vision was improved to 20/100 J6 during the follow-up. On patient 2, postoperative visual acuity stay limited to LP related to preoperative retinal lesions. During the follow-up, any postoperative complication as extrusion, epithelial downgrowth, retrocorneal membrane or endophtalmia was observed.
Conclusions ACCG could be a good alternative to replace osteo-odontal graft in keratoprosthesis surgery especially in young patients with healthy teeth. ACCG has already been widely used for reconstructive surgery and provides safe and stable support to the optical cylinder.However, further comprehensive studies with larger sample size and longer follow-up are required.

• 1145

Peter's anomaly in twins: a rare incidence with novel associations

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Purpose Peter's anomaly is a rare developmental malformation involving the anterior segment of the eye culminating in congenital blindness, with or without systemic associations. herein, we report an incidence of this anomaly in twins with novel associations.

Methods Chart review, clinical and radiological assessment.

Results the probands are 2 year old Saudi boys (twin I and twin II) born to consanguineous mates at 36 weeks following uneventful pregnancy. On examination: both twins were not blinking in response to light and were not able to fixate and follow a moving object with prominent horizontal nystagmus. Slit lamp examination demonstrated varying degrees of central leukoma (corneal opacity) associated with iridocorneal adhesion characteristic of type I peter anomaly in both twins. No catarctous changes were observed. A normal intraocular pressure with intact retinas were seen in both twins. Striking pupillary abnormalities include bilaterally underdeveloped pupil (twin I) and bilateral absence of the pupil (twin II). Ocular ultrasound: revealed bilateral vitreous hemorrhage mostly linked to deranged coagulation. Ocular MRI: showed bilateral microophtalmia and optic nerves hypoplasia with small optic chiasm in both twins. Systemic associations: both twins have coarse facial features and a thrombophilia state secondary to homozygous protein C deficiency; a rare thrombotic condition seen in 1\4000000 live birth. Twin II developed bilateral inguinal hernia and cryptorchidism

Conclusions The novel concordance of peter's anomaly in these twins is probably an emerging evidence supporting the genetic basis of this defect. Optic nerve and optic chiasm hypoplasia along with the severe protein C deficiency and bilateral absence of the pupil are all important associations which have never been reported previously with this anomaly.

• 1146

Graft functionality after DSAEK surgeries in Denmark from 2006 to 2009

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Purpose To report graft functionality after the first DSAEK procedures performed in Denmark.

Methods All primary DSAEK operated eyes in Denmark between 2006 and 2009 were analysed. Patients from three different surgical centers were included, covering all centers performing DSAEK in Denmark during the study period. Events of graft rejection, graft failure and rejection-related graft failure were recorded, and Kaplan-Meyer survival curves were used to determine duration of event-free survival of the grafts.

Results Data collection is ongoing until august 2016

Conclusions -

• 1151

Controversies in the use of NSAIDs

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Pseudophakic cystoid macular edema (PCME) remains the most common cause of poor visual outcome following cataract surgery. Whereas acute PCME may resolve spontaneously, some patients will suffer from vision impairment and are difficult to treat. Even though PCME has been already described 50 years ago, its pathophysiology remains uncertain and a multitude of mechanisms have been suggested. As broad as the mechanisms, are the options to treat this condition. Topical nonsteroidal anti-inflammatory agents (NSAIDs) and corticosteroids either as mono- or combined therapy are commonly used as first line approach. When ineffective, systemic treatment with these agents might be an option. Alternatively, intravitreal application of corticosteroids and anti-vascular endothelial growth factor (anti-VEGF) may offer an effective choice, when first line treatment failed. A critical evaluation of the current knowledge reveals that the optimal treatment of PCME remains unclear and needs further investigation. In addition, prevention should be of foremost importance and is also an open issue. Identification of risk factors, application of NSAIDs and consequent follow up are probably essential steps to avoid this complication.

• 1152

Controversies in the use of steroids

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Cataract surgery is globally one of the most common surgical procedures carried out today. Postoperatively, inflammation in the anterior chamber is nearly inevitable. In order to reduce the inflammatory reaction, patients are commonly prescribed corticosteroid or/and NSAID eye drops 3-4 weeks following surgery. However, compliance is often poor among these elderly patients. Different ways to tackle the problem has been explored. One way is to coat the intraocular lens with steroids. Another way is to inject a substance perioperatively, either as an intracameral injection, subconjunctival injection, or to inject a little dissolvable implant containing steroids. With steroids, there is always the problem with intraocular pressure rise in some patients, making the task more difficult. An overview of the field will be presented, as well as research results.
It is an important topic since cataract surgery is one of the most common surgical interventions in the world. If we can find a substance and formula that can easily be injected at the end of surgery, and replace the treatment with eye drops, it would be of importance. Postoperative complications such as corneal edema, macular edema and posterior adhesions would also be reduced.

• 1153

Controversies in the use of mydriatics

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To obtain a good mydriasis is a key step for a safe and efficient cataract surgery. The most common protocols to dilate the pupil before surgery are based on the instillation of several mydriatic eyedrops, usually a mix of parasympatholytic (mostly tropicamide or cyclopentolate) and sympathomimetic (mostly phenylephrine) preparations. This usual regimen is efficient, but presents several disadvantages, including the side effects due to a systemic passage of the drugs, the topical toxicity on the ocular surface, and the time required by the staff to instillate the drops. One emerging alternative is the intracameral injection of the mydriatic drugs, combined with anaesthetics, just before proceeding to the surgery. We will present the results of a multicenter, randomized and controlled study about the use of a standardised intracameral combination of tropicamide 0.02%, phenylephrine 0.31% and lidocaine 1% before cataract surgery, compared to a standard eyedrops regimen. The intracameral mix was safe and non-inferior to the comparator in terms of pupil dilation, with several potential advantages, including less discomfort during surgery and fewer time spent by the patient in the operating theater.

Conflict of interest
Any consultancy arrangements or agreements:
ALCON, ALLERGAN, MSD, SANTEN, THEA

Any financial support like travel accomodation hospitality etc provided to you or a member of your staff or an accompanying person:
ALCON, ALLERGAN, MSD, SANTEN, THEA

Any Lecture fee paid or payable to you or your department:
ALCON, ALLERGAN, MSD, SANTEN, THEA

• 1154

Controversies in the use of antibiotics

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Postoperative endophthalmitis is an uncommon but potentially sight-threatening complication of cataract surgery. Antibiotics have been used before, during or after surgery and delivered by various routes, including topical, subconjunctival, in the irrigating solution, or by bolus intracameral injection in an attempt to decrease the rates of endophthalmitis. There are also controversies regarding the antibiotic to be used, even when one route of administration is considered. Since there are relatively few randomized clinical trials comparing the timing and administration of prophylactic antibiotics, there are wide variations in prevention practices around the world.

• 1161

Racial differences in the extracellular matrix of the lamina cribrosa and the peripapillary sclera

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Purpose To investigate the major extracellular matrix components(ECM) of the lamina cribrosa(LC) and peripapillary sclera(PPS) in human donor eyes and to determine the differences between Korean and Caucasian eyes.
Methods Posterior segment tissues obtained from nonpathologic, age and axial length-matched 24 Caucasian and 48 Korean donors were used. Protein and mRNA expression of major ECM components were assessed by quantitative polymerase chain reaction, immunohistochemitry, and light and electron microscopy. Biomechanical analysis was performed by obtaining stress-strain curves of the PPS and LC.
Results Collagen and elastin were significantly more abundant in Korean eyes as measured by quantitative polymerase chain reaction and immunohistochemical staining. ECM modulating enzyme, lysyl oxidase like-2 expression was elevated in the PPS and LC of Korean eyes. The width of PPS around the LC region was larger in Korean eyes compared to Caucasian eyes. Collagen fibers had a greater preferred directionality and smaller fibril diameter in the PPS region in Korean eyes observed by electron microscopy. The mechanical properties of the LC and PPS produced greater strain in Korean eyes measured by strain-stress relationship. Increased strain was more pronounced in the PPS region in Korean eyes.
Conclusions The LC and PPS are more easily deformed by similar pressures in Korean eyes compared to Caucasian eyes. Racial differences in the ECM composition and microscopic architecture may contribute to the greater deformation of the LC and PPS and this could contribute to the susceptibility for glaucoma under normal intraocular pressure range in Korean eyes.

• 1162

A curry a day keeps glaucoma away? - A curcumin study

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Purpose Curcumin's neuroprotective potential is challenged by its low solubility and stability at physiological pH. We aimed to solubilise curcumin into a formulation with high encapsulation efficiency (EE) and stability in phosphate buffer solution and to demonstrate its neuroprotective efficacy ***in vitro*** and ***in vivo*** upon topical administration in the well-established ocular hypertensive (OHT) rat model of glaucoma.
Methods A thin-film hydration technique was employed to manufacture curcumin-loaded micelles which were characterised for size and dispersity using dynamic light scattering and transmission electron microscopy. EE was assessed spectroscopically. Stability of the formulation was assessed by measuring changes in particle physical properties and EE over time. Assessment of curcumin mediated neuroprotection ***in vitro*** was achieved using an alamarBlue cell-viability assay in paraquat-treated primary retinal ganglion cells (RGCs). ***In vivo*** assessment of topical curcumin micelle mediated neuroprotection was assessed in the OHT model with primary endpoint of whole retinal Brn3a histology.
Results A solubilised micellar formulation was developed containing 4.5 mg/mL of curcumin with >90% EE. This was found to be stable at room temperature for >45 days, increasing to >6 months with lyophilisation in presence of a cryoprotectant. Curcumin vs vehicle-only pre-treated RGCs had a significantly higher IC50 ***in vitro*** ($p<0.05$). Curcumin-treated vs untreated OHT eyes had a significantly higher RGC density on Brn3a histology ($p<0.001$).
Conclusions A novel curcumin formulation is described which increases its solubility 100-fold to 4.5 mg/mL and is stable for >60 days at room temperature and >6 months on lyophilisation. This formulation elicited significant neuroprotection ***in vitro*** and on 3 weeks of topical ocular instillation ***in vivo***, with no toxicity findings.

• 1163

Transcorneal electrical stimulation prevents secondary retinal ganglion cell death after acute ocular hypertensive injury through modulation of microglia-mediated local inflammatory response

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Purpose To investigate neuroprotective effect of transcorneal electrical stimulation (TcES) on retinal ganglion cells (RGC) after acute ocular hypertension related retinal injury in gerbils.
Methods The right eye of each gerbil was used for experiments. Acue ocular hypertensive injury was induced via intracameral infusion of basic salt solution. Intraocular pressure (IOP) was adjusted by changing the bottle height position. For all gerbis, right eye IOP was elevated to 85 mmHg for 1 hour. In the treatment group, TcES was applied to the surgical eye immediately and then twice weekly for a total of one month. In the control group, sham TcES was given to the surgical eye during the same time points. Retinal function was assessed and compared between groups using a full field flash electroretinogram and a light/dark transition box test. For histological analysis, the number of RGCs, astrocytes and microglial cells were counted by immunofluorescence staining after the gerbils were sacrificed on day 7 and day 28. Real time PCR and western blot analysis were conducted to compare expression of IL-10, IL-6, Cox-2, TNF-α and NFκB phorsphorylation between groups.
Results TcES treated eyes had significantly higher RGC survival at 1 month compared to controls. This was associated with improved RGC function and vision-related behaviour. Furthermore TcES treated eyes were shown to have increased IL-10 expression, with a corresponding reduction in IL-6 and COX-2 expression as well as reduction in NF-kB phosphorylation. This was associated with a suppression in microglial cell activation in TcES treated eyes.
Conclusions Early treatment with TcES in gerbils protected the RGCs from damage and preserved retinal function in acute ocular hypertensive injury through modulation of the microglial-cell activated local inflammatory response.

• 1164

Normobaric hypoxia induces changes in mean ocular perfusion pressure

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Purpose It is still unclear how a normobaric hypoxic stimulus affects mean ocular perfusion pressure (MOPP) in healthy subjects. The Hypoxia Challenge Test (HCT), performed according to the British Thoracic Society (BTS) protocol, mimics the hypoxia levels in medium/long-haul flights, in which cabins are pressurized to a value of around 565mmHg, equivalent to breathing 15,1% oxygen at sea level. We aimed to study the relationship between hypoxia and MOPP.
Methods Prospective cohort study. All volunteers answered a health questionnaire and HCT was performed, according to the BTS protocol. Oxygen desaturation index (ODI) was assessed using the built-in software. Intraocular pressure was measured in three timepoints (baseline, hypoxia, post-hypoxia) using iCare® tonometer. The MOPP was calculated as MOPP=2/3(mean arterial pressure) - IOP. To guarantee data independence, right and left eyes were compared separately. Statistical analyses were performed using STATA 13.0.
Results Studied population included 30 subjects (14 women), with a mean age of 28.8 ± 4.2 [range 22-37] years. There was a within-subject statistically significant difference in MOPP for both right and left eyes ($p < 0.01$). Paired analysis confirmed a significant difference ($p < 0.05$) in MOPP values (in mmHg): baseline (OD = 46.6 ± 6.7, OS = 47.0 ± 6.6), hypoxia (OD = 43.5 ± 6.7; OS = 43.1 ± 6.6) and post-hypoxia (OD = 46.7 ± 6.2, OS = 47.3 ± 5.9). Controlling for age and axial length, a multivariate linear regression model analysis revealed a relationship between MOPP and ODI, for right ($p = 0.01$) and left ($p = 0.07$) eyes.
Conclusions To our knowledge, there is no published data specifically addressing flight cabin hypoxia and MOPP. These results in healthy subjects may help to establish normality responses to a hypoxic stress.

• 1165

Quantification of green fluorescent protein expression in mouse retinal ganglion cells following intravitreal injection of recombinant adeno-associated virus

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Purpose To determine the transduction efficiency and spatial pattern of green fluorescent protein (GFP) expression in mouse retinal ganglion cells (RGCs) following intravitreal injection of recombinant adeno-associated virus (rAAV2).
Methods 16 adult C57bL/6 mice received intravitreal injections of rAAV2-CAG-GFP at 3 different titres: 1 x 10E11, 1 x 10E12 or 1 x 10E13 genomic particles/ml. 2ul of the virus was injected at each concentration. To determine the effect of volume on transduction efficiency, a subset of animals received 1ul of the highest viral titre.

Animals were sacrificed 21 days after injection. Retinal wholemounts were immunostained with Brn3a to identify RGCs and quantification carried out using imageJ software. The percentage of GFP positive RGCs was measured at each titre using Volocity software at 20X magnification. A further 20-25 images at 10X magnification were captured for each titre and merged using to reconstruct the entire wholemount to assess the spatial pattern of expression.
Results RGC transduction rate increased with viral titre; 10% at 1 x 10E11, 53% and 1 x 10E12 and 64% at 1 x 10E13 genomic particles/ml. The volume injected did not appear to affect the transduction efficiency, with 64% of RGCs transduced at the highest titre using either 1 or 2 ul injection. GFP intensity also increased with viral titre with the spatial pattern of GFP expression more extensive at the highest titre. GFP expression at lower titres tended to localise around the injection site.
Conclusions GFP transduction efficiency of RGCs can be quantified efficiently using Volocity software. We have demonstrated an increase in GFP expression and spread at higher viral titres with similar transduction efficiency at a lower volume.

• 1166

Incidence and risk factors of elevated intraocular pressure following deep anterior lamellar keratoplasty

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Purpose To report the rates of elevated IOP following deep anterior lamellar keratoplasty (DALK).
Methods A retrospective study investigating the 5-year incidence of raised IOP following DALK cases performed from 2004 to 2008 in a tertiary centre. Patients with less than 6 months of follow-up were excluded. Elevated IOP was defined as IOP>21mmHg.
Results An episode of elevated IOP occurred in 36.1% (n=44) of 122 cases, 11.4% (n=5) occurring within the first week. The average duration of raised IOP was 48.9 (SD: 65.5) days. Causes included pupil block from air, swollen grafts, and corticosteroid response. Surgical intervention to lower IOP was required in 3 (6.8%) cases. In multivariate analyses, the use of patanol 0.1% or the use of ciclosporin eyedrops before DALK (OR=14.51, 95%CI=1.43-147.23) and the type of topical corticosteroid use post-DALK (OR=4.79, 95%CI=0.73-31.52) were found to be associated with higher rates of elevated IOP post DALK. At 5 years post DALK, 3/71 cases (4.48%) developed de novo glaucomatous field defects, and 1 case with pre-existing glaucoma had progression of glaucomatous field defect.
Conclusions DALK was associated with a significant incidence of transiently elevated IOP post-operatively, but had a low incidence of de novo glaucoma at 5 years in our study. Risk factors for elevated IOP post DALK included the prior use of patanol 0.1% or ciclosporin eyedrops and the type of topical corticosteroid used following DALK.

• 1167

A vascular comparison between primary open-angle glaucoma and normal-tension glaucoma

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Purpose To contrast systemic and ocular vascular parameters in patients with normal-tension glaucoma (NTG) versus primary open-angle glaucoma (POAG).
Methods Sub-analysis of a prospective, cross-sectional, case–control hospital-based study investigating ocular blood flow in glaucoma patients (Leuven Eye Study). Systemic and ocular vascular parameters, including a questionnaire, blood pressure, dynamic contour tonometry, colour Doppler imaging, retinal oximetry and optical coherent tomography enhanced-depth imaging, were compared between an age-matched group of POAG and NTG patients.
Results We included 192 NTG and 214 POAG patients. Patients with NTG presented with significantly lower diastolic blood pressure (P=0.01), decreased acceleration in the central retinal artery (P=0.02), increased resistive index in the ophthalmic artery and central retinal vein (both P=0.04), thinner peripapillary choroidal thickness (P<0.001) and higher retinal venous oxygen saturation (P<0.001). The odds of suffering from hypotension, migraine and Raynaud were significantly higher for NTG patients (95% confidence interval (CI) 1.30-8.73, 1.13-4.42 and 1.36-3.95 respectively), as were the odds of taking systemic bèta-blockers, calcium antagonists and angiotensin II receptors blockers (95% CI 1.04-2.67, 1.21-6.62 and 1.18-5.97 respectively).
Conclusions Patients with NTG differ significantly on several ocular and systemic vascular parameters from POAG patients. These findings add further support to a higher weight for vascular-driven neuropathy in NTG vascular etiology in NTG.

• 1168

A link between Diabetes Mellitus and Glaucoma — Danish Nationwide Study

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Purpose To determine the effect of anti-diabetic medication on glaucoma. Furthermore, to investigate if diabetic comorbidities and concomitant medications are associated with glaucoma in patients treated with anti-diabetic medication.
Methods Retrospective nationwide cohort study, spanning a 16-year follow-up period. The National Danish Registry of Medicinal Products Statistics was used to identify all claimed prescriptions for glaucoma medication and anti-diabetic drugs. Comorbidities with diabetic retinopathy and diabetic nephropathy were identified using the ICD-10 classification and the Danish National Patient Register.
Results A total of 6,343,747 individuals in the period 1996 to 2012 were included. The overall incidence rates of new-onset glaucoma were 0.07 and 0.36 per 1000 person-years for the reference population and for diabetes mellitus, respectively. Patients treated with anti-diabetic drugs at any time during the study period had a significantly higher overall relative risk of glaucoma (RR=5.11, p<0.0001), even when controlling for age, gender, diabetic retinopathies and calendar year-fixed effects (RR=2.05, p<0.0001). For patients treated with anti-diabetic drugs, we found an increased hazard for development of glaucoma in patients with diabetic retinopathies (HR=1.40) and joint complications with diabetic retinopathies and diabetic nephropathy (HR=1.40). Furthermore, we found that concomitant antihypertensive medications were associated with an increased likelihood of glaucoma overall, while treatment with β-blocker and RAS, in combination, are associated with a significantly lower risk (HR=0.87).
Conclusions Use of anti-diabetic drugs is strongly associated with use of anti-glaucomatous drugs. Diabetic complication as well as concomitant antihypertensive medications affect the risk of glaucoma in patients treated with anti-diabetic drugs.

• 1171

When and why proteomic approach is needed?

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Ocular surfaces are delicate structures of the anterior segment of the eye protected, nourished and lubricated by tear fluid. The system has it's own regulatory mechanisms. Ocular surfaces are exposed environmental factors, topical ophthalmic drugs and affected by various ocular and systemic diseases. Inflammation and wound healing are vital processes involved in the defense mechanisms of the human body and pathogenesis of many eye diseases. It is also one of the most important factors in many ocular surgeries e.g. corneal, refractive and glaucoma surgery. It consists of many overlapping processes like inflammation, fibroblast activation, ECM production and remodeling of the ECM and there are many mechanisms and mediators involved in it. Tear proteomics is a powerful tool to diagnose and detect mechanisms and drugable targets of the ophthalmic and systemic diseases. This course is focusing in the proteomics and biomarkers of the tears and anterior surface of the eye in relation these diseases. The idea is to give practical instructions and advice when and how proteomic analysis is relevant to perform in research.

• 1172

Proteomics of tear fluid

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The tear film overlying the delicate ocular surface epithelial cells are a complex extracellular fluid with components from the orbital and accessory lacrimal glands, ocular surface epithelial cells, goblet cells, Meibomium glands and as an ultrafiltrate of the blood. Molecular information regarding the health of the ocular surface is reflected in both the quantity and quality of the tear constituents. Moreover, this information can be acquired quantitatively and used for the diagnosis, prognosis and treatment of ocular surface disease and can be used as biomarkers for precision medicine. Recent studies have shown that the tear proteome contains over 1500 identifiable proteins. Highly abundant proteins include lysozyme, lactoferrin, lipocalin, lacritin, and the proline rich proteins. The tear proteome is clearly shown not to be a simple reflection of the blood. As an extracellular fluid, inflammation is revealed in the tear fluid by upregulation of the pro-inflammatory proteins S100A8 and S100A9.

• 1173

Practical examples of tear proteomic studies

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Abstract not provided

• 1311
Contact lenses

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Abstract not provided

• 1312
Anterior chamber lenses

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The anterior chamber intraocular lens (ACIOL) is the ideal intraocular lens (IOL) both for implantation during intracapsular cataract extraction and for secondary implantation. It is also useful during extracapsular cataract surgery, being especially indicated if there is a total absence of capsular support.
ACIOLs are preferred over sulcus-sutured IOLs because they are technically easier to implant, are reasonably well-tolerated, and have a low rate of postoperative IOL decentration or tilt. However ACIOLs have also become one of the causes of IOL exchange and explantation.
Implant-related problems such as discrepancies between anterior chamber biometry and IOL size may cause pseudophakodonesis in the aqueous, resulting in progressive endothelial cell loss. Because of endothelial complications, they must be reserved for elderly patients.
Infrequently, ACIOL-iris contact may lead to pigment dispersion with subsequent inflammation. Occasionally, secondary angle closure and glaucoma with corneal decompensation due to haptic displacement may develop. Due to these reasons, eyes with shallow anterior chambers or early corneal guttata have been treated as relative contraindications for ACIOLs.

• 1313
Iris claw

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Iris claw has been proposed in the management of aphakia, as anterior chamber and scleral IOL fixation. Fixation of this PMMA lens is based on enclavation of a fold of iris tissue without sutures, centered over pupil without affecting mydriasis, iris vasculature and o fluorescein leakage)angle structuresangle structures. Surgical procedure of anterior versus posterior implantation will be detailled. Per- and postoperative complications will be discussed.
The choice of surgical modality may be individualised for specific patients taking into consideration anatomical characteristics (anterior chamber depth, EC count), prexisting ophthalmic pathologies, and surgeon experience.isting ophthalmic pathologies

• 1314
Sleral structured iol

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Abstract not provided

• 1315

Sclear embedded iol

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AIM: to evaluate if the embedding of an Intraocular lens in the sclera is an easy , safe and beneficial for the patients with aphakia surgical procedure.
METHODS: We examined the notes of 42 patients who underwent surgery for aphakia and they had an scleral embedded IOL. All procedures performed by the same surgeon under the same settings at Venizeleio Hospital of Heraklion.
RESULTS: Final visual acuity, stability, difficulty of the procedure, astigmatism produced, complications and patients satisfaction were recorded. We will also present videos with different techniques to stabilize an IOL in the sclera.
CONCLUSION: We will produce evidence that scleral embedded IOLs is a safe and easy procedure which produces very good results.

• 1316

Aniridia implants

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Abstract not provided

• 1321

The view of the doctor in training

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The aspirations of a resident play an important aspect of the motivation during work. A comprehensive view of the type of training and which skill sets residents expect to gain, from surgical to medical expertise to opportunities in research will be explored during this lecture.

• 1322

The view of a director of training

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Training residents is a task that poses a challenge and an opportunity to every Institution. A teaching centre has a dual responsibility, first to assure the adequate care for the patients and second to guaranty the residents and fellows the best possible training. For these reasons management decisions have to promote the best standard of care for the patient while creating the opportunities for residents to learn. Moreover, residents should not only be trained in just clinical Ophthalmology as research is an important part or the learning process. So trainees should be actively involved in the research program of the Institutions. All these and the continuous rotation of the residents creates logistical and planning challenges that should be solve.
In summary a complete and successful program requires commitment of the Institution, the Staff/Consultant Ophthalmologists and the residents.

• 1323

The view of the EGS and the subspecialty exam

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This part of the SIS will deal with the question: "how do we define a glaucoma specialist today "
Since the creation in 1978, the EGS has been strongly involved in teaching and training glaucoma in Europe and worldwide. In order to implement the EGS mission statement for education: "Promotion of evidence-based practice and life-long learning through systematic, extensive and renewable training" the EGS is constantly organizing and updating a large number of teaching-learning activities. ; it hosts since 2007 a yearly two-day European Residents Glaucoma Course, gives travel support for 1-year glaucoma fellowship program in leading European university hospitals, publishes and updates since 1998 the Terminology and Guidelines for Glaucoma , holds a biannual Glaucoma Congress and runs EBO-accredited courses. While the EGS has not the authority to impose fellowship-programs to different countries or institutions in Europe, it can set clear requirements and standards of knowledge that define a "glaucoma specialist". Testing this knowledge by the EGS-EBO subspecialty exam and providing the FEBOS diploma represents a logical continuation of the creation of sustainable education and glaucoma care within Europe.

• 1324

How can we improve?

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How can we improve glaucoma training in Europe?
In Europe teaching and training in ophthalmology is very heterogenous. The EBO (European Board of Ophthalmology), as the official educational working body of the UEMS has gained respect in working on improvement of standards in the field of general ophthalmology by organizing a yearly EBO exam and providing to successful candidates the FEBO – diploma. Recently EBO has introduced the project of ***Fellow of the European Board of Ophthalmology Subspecialty Diploma*** (FEBOS) examinations. The EGS was the first European society invited to actively take the lead in organizing and chairing FEBOS examinations in Glaucoma. While EBO remains the "umbrella organization", EGS has received the responsibility to determine clear eligibility criteria for candidates to sit the exam. Among other documents, EGS has elaborated a detailed log-book, requirements defined as "mandatory" or "suggested" in theoretical and clinical knowledge. By setting these requirements reflecting high standards of knowledge in the field of glaucoma EGS aspires to influence in future fellowship-programs in glaucoma-teaching centers in Europe.

• 1325

What did we learn from this session?

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An overall discussion of the subject will be held. The audience and speakers will both be encouraged to discuss the pros and cons of each of the previous lectures as well as to briefly brainstorm on the problems facing the design of an ideal glaucoma rotation.

• 1331

B27-associated uveitis, Fuchs uveitis

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B27-associated uveitis is a very frequent form of non infectious intraocular inflammation which account for approximately 50 % of acute anterior uveitis. Its main clinical features, natural history and association with seronegative arthritis are well known. Fuchs uveitis is another frequent cause of anterior and intermediate uveitis. Its natural history is well characterised as well as its association with intraocular production of anti-rubella antibodies. Both diseases are thus often considered as easy diagnosis. However, several aspects of those diseases remain challenging and debated. In this interactive course, based on clinical cases, we will insist on those difficult aspects as well as on the more recent issues discussed in the literature

• 1332

Infectious uveitis

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Based on the anatomical involvement of the eye intraocular inflammation is classified into anterior, intermediate, posterior and panuveitis. All subtypes of uveitis are potentially related to infectious and noninfectious etiologies.
This presentation will assist the participants in accurately diagnosing uveitis in a step latter approach including physical and laboratory investigations.
In addition, a tailored approach based on confounding clinical observations with specialized investigations will help to further differentiate clinical entities. In cases of suspected intraocular infections the option of intraocular fluid evaluation for antibody testing and polymerase chain testing against the causative agent will be presented. Taken together, this part of the course will provide a rational decision-making strategy for diagnosis of patients with uveitis.

• 1333

Behçet's disease, VKH, sarcoidosis

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Ocular involvement associated with Behçet disease is characterized by a relapsing remitting panuveitis with diffuse vitritis, retinal infiltrates, and occlusive vasculitis. Proper management relies on the early use of immunosuppressive drugs in combination with corticosteroids and administration of biologic agent in resistant and severe posterior segment involvement. VKH disease is a bilateral panuveitis that may be associated with extraocular manifestations. Exudative retinal detachment, associated with typical imaging findings, is the most specific feature to acute VKH disease. Sunset glow fundus is typical to chronic VKH disease. Complications are more likely to occur in the chronic recurrent phase. The mainstay of treatment for acute VKH disease relies on systemic corticosteroid therapy for at least 6 months. Immunosuppressive therapy is mainly used in chronic recurrent disease.
Main ocular features of sarcoidosis include bilateral granulomatous anterior uveitis, vitritis with snowballs, multifocal chorioretinitis, and segmental periphlebitis. Diagnosis may be challenging in the absence of apparent systemic involvement. Treatment of sarcoidosis relies on corticosteroids and immunosuppressive agents, in severe cases.

• 1334

Inflammatory choroiditis

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Non-infectious choroiditis is classically subdivided into at least two main categories, including choriocapillaritis and stromal choroiditis. In the latter, the site of inflammation is situated in the choroidal stroma. When inflammation exclusively originates from the choroidal stroma which is the target of an immune reaction such as in Vogt-Koyanag-Harada disease (VKH), sympathetic Ophthalmia (SO) or birdshot retinochoroiditis (BRC), the term of primary stromal choroiditis is used. When the choroidal stroma is a chance and random location of a systemic disease such as sarcoidosis, the term of secondary stromal choroiditis is used. In the choriocapillaritis group the lesion process is an inflammatory non perfusion of the choriocapillaris, a mechanism occurring or suspected to occur in diseases such as multiple evanescent white dots syndrome (MEWDS), multifocal choroiditis, acute posterior multifocal placoid pigment epitheliopathy (APMPPE). The difference of these two mechanism will be further presented with the help of practical examples presented in the same fashion as the "viva voce" EBO examination.

• 1335

Retinal vasculitis

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Retinal vaculitis is a sight-threatening inflammatory eye condition that involves the retinal vessels. Detection of retinal vasculitis is made clinically, and is confirmed with the help of fundus fluorescein angiography. Active vascular disease is characterized by exudates around retinal vessels resulting in white sheathing or cuffing of the affected vessels. In this review, a practical approach to the diagnosis of retinal vasculitis is discussed based on ophthalmoscopic and fundus fluorescein angiographic findings.

• 1341

Trans-scleral delivery of novel anti-angiogenic small molecule inhibitors of SRPK1

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Purpose Development of non-invasive, novel therapies for wet age-related macular degeneration (wAMD) and diabetic macular oedema (DME) is hindered by insufficient delivery to the retina. SRPK1 is a novel target that regulates VEGF-A splicing. We used a rational medicinal chemistry approach to specifically design novel inhibitors with properties required for trans-scleral delivery.
Methods Freshly enucleated porcine eyes were dissected, and eye tissue was clamped into a scaffold with inhibitors in the upper chamber facing the sclera. Tissue was dissected at 24 h and compound measured by mass spectrometry. Compounds were screened based on structure, potency, selectivity, molecular weight, cLogP and SAR to inform further development. Efficacy and PK were evaluated in vivo in C57/Bl6 mice. New Zealand White rabbits received 3x daily eye drop for 6 days then eyes were dissected, compounds analysed by mass spectrometry.
Results Potent SRPK1 inhibitors had improved permeability ex vivo compared to pazopanib (SPHINX-A 1.47x10-6 cm/s, Pazopanib 0.07x10-6 cm/s P<0.0005). Modifications of the R1 and R2 domains, based on crystal structure analysis, led to enhanced permeability (SPHINX-B 3.46 cm/s*10-6). Permeability did not correlate with molecular weight or cLogP but could be affected by additional parameters such as melanin binding. SPHINX-A was detected at 0.008 % of the total applied dose (84 ug) and above its target IC50 value in rabbit eyes. SRPK1 inhibitor eye drops inhibited laser-CNV (EC50s<0.5µM, n=6-8, P<0.05, One-way ANOVA).
Conclusions With increased specificity, potency and trans-scleral permeability, novel SRPK1 inhibitors have potential to reach therapeutic levels in posterior eye segments following eye drop administration and improve treatment for patients with wAMD and DME.

Conflict of interest
Any post or position you hold or held paid or unpaid?:
I am a full time employee of Exonate Ltd, which is a spin out company from the University of Nottingham and an associate at the University of Nottingham, so my salary and work is funded directly by Exonate Ltd. I do not hold any shares.

• 1343

Results of microinvasive cross-linking of rabbit posterior eye pole sclera

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Purpose To evaluate the results of scleral crosslinking (SXL) with ultraviolet-A (UVA) radiation and riboflavin in the equator and the posterior pole of the eye using a minimally invasive technique
Methods The tool includes a UV-LED source (370 nm, 3 mW/cm²) guided through optic fiber located in one of the two channels of a detachable tip. The other channel is used to deliver riboflavin to the scleral surface through a small conjunctival incision, sutured after SXL. It was performed ***in vivo*** on 8 rabbit eyes. Intact fellow eyes served as control. Scleral echodensity was measured ***in vivo*** with Voluson 730Pro prior to, 2 days and 1 month after the procedure. The biomechanical characteristics of the sclera of enucleated eyes were measured 3 days and 1 month after the procedure with Autograph (Shimadzu). Collagen crosslinking level was measured at the same times using Differential Scanning Calorimetry with Phoenix DSC20144 (Netzsch).
Results As a result of the procedure, scleral echodensity (median) increased from 86.7 dB to 98 dB after 2 days, and to 103 dB after 1 month. The control group revealed no change in the corresponding values. Elasticity modulus (E) of the treated zone was 25.4 MPa after 3 days, while in the control group E was 16.7 MPa. 1 month after, the value of E showed no significant change. Collagen cross-linking level in the experimental group exceeded that of the control group by 15-18%.
Conclusions The proposed tool ensures minimally invasive UVA crosslinking of the equatorial and the posterior parts of the sclera and ensures an increase of its biomechanical stability. It opens good prospects for sclera reinforcement treatment of progressive myopia.
This work was supported by the Russian Foundation of Basic Research (grant No 15-29-03874).

• 1342

Toward rational design of gene carriers: a novel ex vivo model to study the vitreoretinal interface as a barrier

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Purpose The vitreoretinal interface poses a serious hurdle for the retinal delivery of viral and non-viral gene vectors after intravitreal injection. We have therefore developed a retinal model especially designed to study to which extent the ILM is a barrier for the penetration of vectors into the retina. In contrast to all existing explant models, ours is bovine-derived and more importantly, the vitreous remains attached to the retina at all times to guarantee an intact vitreoretinal interface.
Methods To investigate the influence of nanoparticle physicochemistry on their ability to penetrate the ILM we have injected various carboxylated polystyrene particles with a size range between 20 and 200nm intravitreally in our model. After diffusion overnight the Müller cells are stained with Mitotracker Deep red and the nuclei with Hoechst. Finally, a z-stack of confocal images of the retina is recorded using a water dipping objective that is brought into contact with the vitreous layer on top of the retina.
Results Our data clearly illustrated that the ILM significantly hinders particle penetration into the retina. We also found that this penetration is greatly size-dependent: the cut-off for nanoparticles to cross the ILM lies between 40 and 100nm. Intriguingly, the particles that did cross the ILM co-localized solely with Müller cells, indicating these cells actively capture the nanoparticles out of the ILM and shuttle them into the retina.
Conclusions In conclusion, we developed a model set-up greatly mimicking human physiology to investigate the influence of particle physicochemistry on their ability to cross the ILM after intravitreal injection. This data collection will signify a leap forward in the rational design of gene vectors with the retina as their target, since this way their design can be tuned to actual ***in vivo*** requirements.

• 1344

Retinal α-synucleinopathy: taking a new look at Parkinson's disease.

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Purpose Although it is well-documented that many patients with Parkinson's disease (PD) present with visual disabilities, scientific research has largely neglected the relation between PD and retinal dysfunction. A profound understanding of the retinal manifestations of PD, however, would not only help to gain new insights into its pathogenesis, it would also open up new avenues to improved disease management. Therefore, we have set out a comprehensive study to map retinal changes in several rodent models of PD/α-synucleinopathy.
Methods Two established models of PD/α-synucleinopathy were used, ***i.e.*** the rotenone-induced PD model in rats and a Thy1-aSYN transgenic mouse line. In addition, a novel mouse model for the study of α-synucleinopathy in the retina, based on local, viral vector-mediated overexpression of α-synuclein, was developed. Retinal neurodegeneration was studied via (i) ***in vivo*** imaging with optical coherence tomography and DARC (detection of apoptotic retinal cells); (ii) vision-guided behavior tests; and (iii) (immuno)histological stainings for dopaminergic neurons (tyrosine hydroxylase), Lewy bodies (α-synuclein, thioflavin) and apoptosis (cleaved caspase-3), combined with specific retinal cell markers.
Results Our results suggest that retinal changes related to PD/α-synucleinopathy can be identified non-invasively in these animal models and monitored over time. Moreover, histological analysis points out that specific retinal cell populations are affected, and that retinal changes precede PD manifestations in the brain.
Conclusions This study brings together the first comprehensive data set on retinal manifestations in rodent models of PD/α-synucleinopathy, and provides novel conceptual insights to support the idea that changes in retinal function/morphology can be used as early biomarkers for diagnosis and evaluation of treatment.

• 1345

Exploration of human tear proteome

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Purpose The tear film is a complex structure which constitutes an interface between our eyes and the external environment. Its protein, lipid and metabolite composition is highly regulated depending on several factors. Despite its attractive characteristics, this fluid is still poorly studied. Here we present an in-depth human tear proteome based on a mass spectrometry approach
Methods In this study, tears of two healthy controls (two women aged 59 and 61 years) were collected with Schirmer's papers. After trypsin digestion and off-gel electrophoresis fractionation, two proteomic analyses were performed by mass spectrometry (using LTQ Orbitrap Velos Pro coupled to a liquid chromatography). Resulting files were searched against the UniProt-SwissProt/TrEMBL database (version 2014_10) and a false discovery rate of 1% was selected. The protein list was analysed using Ingenuity Pathways Analysis and Cytoscape software.
Results Globally 2105 and 825 proteins were identified with 1 and 2 unique peptides respectively after removing keratins and immunoglobulins. Regarding the 825 proteins, the top three pathways that we highlighted were the acute phase response signalling, the remodelling of epithelial adherens junctions and the clathrin-mediated endocytosis signalling. Moreover, we identified 203 proteins that were not found in the previous published studies. By comparing our tears with others fluids, only 26.9% were identified in vitreous humor and 45.7% in plasma, confirming that tears have a specific composition.
Conclusions Thanks to this study, we are able to propose an expanded tear proteome. Both specific proteins of the tears and correlations with other fluids give them a great potential for biomarker research.

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• 1346

In the search of biomarkers for thyroid associated orbitopathy (TAO)

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Purpose Tears are known as lubricating the eyes and ensuring nutrition and protection of the surrounding ocular tissues. However, its composition is the result of a dynamic system, which is dependent on various stimuli, including ocular and systemic diseases. Here, we propose that, tears could represent an innovative source of biomarkers in thyroid-associated orbitopathy (TAO) disease
Methods Schirmer's test was adopted to collect tears from TAO (N =20, 3 males, mean age (±SD): 46.0 years (±13.0)) and healthy patients (N =18, 8 males, 45.4 years (±18.7)). Independent isobaric proteomics experiments were carried out and analyzed on a linear trap quadrupole Orbitrap Velos Pro. Easyprot software was used to obtain protein identification and quantification (2 unique peptides, 1% FDR, ratio<0.66 or >1.5, p-value>0.05). Biological process and pathways were analyzed using Ingenuity pathway analysis software (6.7 version). Verification of proteins was performed by Western Blot or immunoassays.
Results Globally, 646 proteins were identified and 62 were considered as differentially expressed (27 up-and 35 downregulated). Interestingly, among them, the acute phase response signalling and glycolysis pathways were mainly represented. Verification is ongoing for these candidates. In parallel, we observed that the levels of IL-6, IL-10, IL-12 and TNF-α, were significantly upregulated in tears of TAO patients.
Conclusions These results confirmed tears as a suitable source to discover biomarkers for TAO disease. Moreover, the emergence of proteins involved in the glycolysis, associated to inflammation, could bring new general knowledge about TAO that still remains not well characterized.

This study is kindly supported by the Provisu foundation and the SNF_MHV (PMPDP3_158370).

• 1347

Variation of accommodative process and anterior chamber parameters in diabetic patients

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Purpose Chronic hyperglycemia is responsible for vascular and neurodegenerative retinal changes in diabetic patients. However, other eye structures have been also associated with changes, such as corneal biomechanics and lens thickness.
The author's objective was to analyze the accommodative process – crystalline structural change and pupillary diameter based on Anterior Segment Optical Coherence Tomography (AS-OCT).
Methods Prospective case-control study. The anterior chamber parameters were studied using AS-OCT. The monocular accommodative process was obtained with different Dioptric Powers (0 D, 2.5 D, 5 D and 7 D – lens integrated in the OCT software) in both controlled photopic and scotopic conditions. 2 groups have been analyzed: group 1 with type 2 diabetic patients and group 2 with healthy-controls. Measurements of anterior chamber depth (ACD), lens vault (LV), pupillary diameter (PD) and iris thickness (IT) were obtained.
Results A total of 71 patients were evaluated (group 1 – n = 36; group 2 – n=35). The mean age was 69.15±5.55 years. Diabetic patients have showed the basal highest LV and lowest ACD values, with statistically significance (p<0.05). In highest accommodative power, group 2 has experimented a significant reduction in ACD, ACA and PD (p<0.05). The LV change has not proved important in the process. Group 1 has showed a significant response in scotopic conditions, even with a lower response with the highest accommodative stimuli compared to group 2.
Conclusions The accommodative process is impaired in diabetic patients, with a significant difference in pupillary response more than in lens vault. This could be important to explain the importance of the anterior segment of crystalline in accommodation. Further studies will be necessary to clarify the DM effects on these parameters.

• 1351

Scanning Laser Ophthalmoscopy - Basic Optical Principles

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Scanning Laser Ophthalmoscopy (SLO) produces an ocular fundus image by moving a focused laser beam via scanning mirrors over the retina in a grid pattern and registering the reflected light from each scanned point. In confocal SLO, a pinhole is placed in front of the detector to cut off scattered or defocused light coming from outside the point of interest, which otherwise can blur the image. This results in a focused, high-contrast image of a single tissue layer located at the focal plane. Tomographic information can be extracted by moving the plane of the pinhole. The use of various wavelengths allows for different applications, such as fluorescein angiography, indocyanine green angiography, and autofluorescence imaging. This lecture will present the basic principles of SLO, as well as discuss notable applications and variants of the technology.

• 1352

Optical Coherence Tomography - Basic Optical Principles

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Optical Coherence Tomography (OCT) is an optical analogue to ultrasound imaging. The much higher speed of light compared with sound allows for finer cross-sectional views of the retina and anterior segment. Since it is extremely difficult to directly detect the shorter "echo" times it takes light to travel from different structures at axial distances within the eye, interferometry is used. Incident light is thus split into two beams, and the beam backscattered from the ocular tissue is then compared ("interfered") with the beam that has traveled a known time from the reference mirror. Broadband (i.e., low "coherence") light sources are used, because they produce a wider band of wavelengths, and thereby enable greater sensitivity in comparing the travel time differences of the two beams. In time-domain OCT, the reference mirror position is altered, so that interference patterns are generated whenever the two beams have traveled almost the same amount of time. In spectral-domain OCT, the reference mirror position is fixed and the mixed interference patterns are separated via spectral wavelength analysis. This lecture will explain underlying concepts of OCT with a discussion of cutting-edge technological developments.

• 1353

Adaptive Optics - Basic Optical Principles

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Adaptive Optics (AO) refers to a technique to compensate for distortions caused by optical aberrations in the media between the camera and the object being imaged. It was originally developed for use in astronomical telescopes to compensate for optical distortions induced by the inhomogeneous earth atmosphere. It has since evolved to become a powerful clinical tool in ophthalmology. In the eye, a "wavefront sensor" (aberrometer) measures the distortion of incoming light induced by inhomogeneities within the cornea and crystalline lens, which is then "undistorted" via reflection by a deformable mirror. AO thus enables imaging of the human retina with unprecedented resolution ***in vivo***, such as revealing individual photoreceptors or the walls of blood vessels. One should note that AO by itself does not provide an image; rather an AO subsystem is incorporated into an existing imaging device. AO subsystems have thus far been successfully integrated into three ophthalmic imaging devices: fundus cameras, scanning laser ophthalmoscopes, and the OCT device. This lecture will introduce the basic principles of AO, illustrate its value with state-of-the-art clinical examples, and discuss potential future applications in ophthalmology.

• 1361

The Global Vision Database – modeling the current and changing burden of eye disease

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The Global Vision Database has been established by an international consortium of 79 ophthalmologists and optometrists with an interest in the epidemiology of eye disease (The Vision Loss Expert Group, VLEG). This is an extremely comprehensive database of high quality population-based prevalence eye surveys, dating from 1980 to 2015 from published and unpublished sources. The VLEG have published estimates of numbers blind and vision impaired by region worldwide by age, by sex and by cause. Working with the World Health Organisation, the group has been able to model the change in cause-specific prevalence of vision loss over time, reporting recently the reduction in age-standardised blindness prevalence over this time period. This talk will describe the project, the model used and the most recent findings and projections and introduce the audience to the visualisations project that makes this data accessible to any internet user.

• 1362

The E3 consortium – European Eye Epidemiology

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The European Eye Epidemiology (E3) consortium is a recently formed consortium of 32 groups from 13 European countries. It already comprises more than 40 studies (population-based, case-control, cases only, randomized trials), providing ophthalmological data on more than 170,000 European participants. The aim of the consortium is to promote and sustain collaboration and sharing of data and knowledge in the field of ophthalmic epidemiology in Europe, with particular focus on the harmonization of methods for future research, estimation and projection of frequency and impact of visual outcomes in European populations (including temporal trends and European subregions), identification of risk factors and pathways for eye diseases and development and validation of prediction models for eye diseases. Coordinating these existing data will allow a detailed study of the risk factors and consequences of visual impairment and eye diseases, including study of international geographical variation which is not possible in individual studies. Most studies also include biobanks of various biological samples, which will enable identification of biomarkers to detect and predict occurrence and progression of eye diseases.

Conflict of interest
Any consultancy arrangements or agreements:
Allergan, Bausch+Lomb, Laboratoires Théa, Novartis
Any research or educational support conditional or unconditional provided to you or your department in the past or present:
Laboratoires Théa

• 1363

The Montrachet Study

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The Montrachet Study (Maculopathy Optic Nerve nuTRition neurovAsCular and HEarT diseases) is a population-based derived from the 3C Study performed in Dijon. In 2009–2011, 1153 participants from the 3 Cities Study, aged 75 years or more, had an initial eye examination. Apart from the old age of this population, the main interest is that information on cardiovascular and neurologic diseases and a large comprehensive database (blood samples, genetic testing, cognitive tests, MRI) were available. Our first results showed us that despite the high prevalence of self-reported eye diseases in this elderly population, visual impairment was low and increased with age. These results can improve our knowledge on the characteristics of ocular data in the elderly as well as the relations between eye and age-related vascular and neurologic diseases.

• 1364

Molecular Genetics in Ocular Epidemiology

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Common ocular diseases, such age-related macular degeneration (AMD), are often caused by a combination of genetic and environmental factors. Genome-wide association studies (GWAS) can shed light on the disease pathogenesis and provide clues for treatment. GWAS have identified genetic variants at more than 40 genomic regions to be involved in AMD. The currently known risk factors have a moderate-to-high predictive value for AMD, with an area-under-the-curve of 0.8 to 0.9. Based on the genes that have been identified, we now know that three main pathways are involved in AMD pathogenesis: the complement system, the lipid metabolism and the extracellular matrix. Higher levels of systemic complement activation have been detected in AMD patients compared to controls, which can partly be attributed to genetic variants in the complement system. Several antibodies targeting the complement pathway are currently in the clinical trial phase for AMD. In conclusion, AMD is a successful example of how genetic studies can lead to the development of new treatments, and such studies will also be valuable for understanding the disease mechanisms of other common ocular diseases.

• 1371

Hypoxia and inflammation in human retinal cells

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Purpose Retina is extremely sensitive to low oxygen tension as its metabolic rate is the highest one among tissues. In diabetic macular edema, there always occur both hypoxia and inflammation. It is not, however, clear if VEGF release in hypoxia takes place without inflammation in retinal cells. We set out to study the issue using both human ARPE cells and human primary RPE cell culture.
Methods Human ARPE-19 cells were routinely cultured in humified CO2 atmosphere as reported previously. The cells were exposed for 24h to hypoxia and a part of a cell culture was followed up to 48h. Inflammatory responses were induced with a pre-treatment by bacterial lipopolysaccharide (LPS). In parallel, human primary RPE cells were used to verify results. IL-6, IL-8, IL-1β, IL-18 and VEGF were measured with specific ELISA kits. Statistical analyses were performed with the GraphPadPrism software.
Results Significantly increased IL-6 and IL-8 levels were found after hypoxia exposure in ARPE cells and the trend was seen in the primary RPE cell culture as well; LPS-treatment did not change the expression profile of these interleukins. Hypoxia and LPS pre-treatment did not affect the release of IL-1β and IL-18. The hypoxia exposure increased significantly the release of VEGF as anticipated but the LPS pre-treatment had no effects on the release.
Conclusions Hypoxia induced inflammation both in human ARPE cells and in human primary RPE cell culture as shown with IL-6 and IL-8. LPS pretreatment increased this response. Hypoxia stimulated directly the VEGF secretion independent of the inflammatory pathway.

1372

Mitochondrial inhibition of retinal Müller cells alter glutamate homeostasis and their ability to sustain retinal ganglion cells

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Purpose Glia-neuron partnership is important for inner retinal homeostasis and any disturbances may result in retinal ganglion cell (RGC) death. Müller cells support RGCs with essential functions such as removing excess glutamate and providing neurons with energy sources. In this study, we evaluated consequences of mitochondrial inhibition on retinal Müller cells and their ability to sustain RGCs.
Methods The human Müller glial cell line, MIO-M1, as well as mono- and co-cultures of primary C56Bl/6 mouse Müller cells and RGCs, was used as cellular models. Cells were treated with 10 uM antimycin A to inhibit mitochondrial function. Changes in glutamate uptake in Müller cells were examined by kinetic assays with 3H-L-glutamate. Cell viability was evaluated by LDH assays. Regulations in gene and protein expression were evaluated by qPCR and western blotting.
Results Mitochondrial inhibition significantly reduced protein- and mRNA expression of the major glutamate transporter, EAAT1, in Müller cells. Moreover, mitochondrial inhibition significantly decreased Müller cell glutamate uptake. Mitochondrial inhibition solely did not effect cell viability neither in Müller cells nor in RGC. However, simultaneous mitochondrial inhibition and starvation significantly decreased survival of both cell types. The protective effect of Müller cells in co-cultures of primary RGCs and MCs were attenuated during mitochondrial inhibition.
Conclusions Inhibition of mitochondrial function alter the neuroprotective characteristics of Müller cells by decreasing the expression of glutamate transporter and functional reduction of glutamate uptake. Furthermore, the impaired mitochondrial activity may affect the ability of Müller cells to maintain a cellular homeostasis in such way that their ability to protect RGCs may to suffer.

• 1373

LACTATE: A valuable energy substrate in maintaining survival and function in the inner retina

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Purpose To evaluate the effect of lactate on Müller cell and retinal ganglion cell (RGC) survival and function.
Methods The human Müller cell line MIO-M1 was incubated in media with the presence and absence of 6 mM glucose and furthermore with the presence and absence of respectively 10 mM and 20 mM L-lactate for 2 hours and 24 hours. Same conditions were used in primary mice Müller cells and RGC. Cell survival was assessed through MTT. Müller cell function was evaluated through the Müller cells' ability to take up glutamate.
Results Both 10 mM and 20 mM L-Lactate increased cell survival after 2 hours and 24 hours with and without the presence of glucose. After 24 hours only 20 mM increased cell survival in Müller cells incubated in media containing glucose. Glutamate uptake increased in glucose restricted Müller cells compared to cells with glucose availability. The addition of lactate to the incubation media decreased the uptake in both glucose supplemented and restricted cells. After 24 hours this effect was altered resulting in increased glutamate uptake in response to 10 mM L-Lactate.
Conclusions We hereby verify lactate as being an important energy substrate for the survival of Müller cells both in the presence and absence of glucose. Furthermore, our study indicates that Müller cells prefer lactate as an energy substrate compared to glutamate after 2 hours, however after 24 hours the energy substrate requirement enhances resulting in a compensatory increase in glutamate uptake.

• 1374

Mechanisms behind the protein aggregation-related inflammasome activation in RPE cells

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Purpose Inflammasomes are intracellular protein complexes whose activation results in the caspase-1-mediated release of pro-inflammatory cytokines IL-1β and IL-18. We and others have shown that activation of NLRP3 inflammasome is associated with the pathogenesis of age-related macular degeneration (AMD). Declined proteasomal degradation with concurrent autophagy inhibition is among the risk factors activating the NLRP3 receptor in retinal pigment epithelial (RPE) cells. NLRP3 is known to have various activation mechanisms and in the present study, we have analyzed which of them contribute to the inflammasome activation when protein degradation systems in RPE cells fail.
Methods Inflammasome activation was induced in human ARPE-19 cells by the proteasome inhibitor MG-132 and the lysosome neutralizer Bafilomycin A. Extracellular ATP was measured, and its receptors were inhibited using a P2X7 inhibitor. Potassium efflux was inhibited using high extracellular ion concentration, and glyburide was added to block the ATP-mediated potassium efflux. APDC (ammonium pyrrolidine dithiocarbamate) and NAC (N-acetylcysteine) were used to reduce oxidative stress.
Results Despite increased extracellular ATP level, the inhibition of P2X7 receptors did not reduce the secretion of IL-1β. Neither potassium efflux nor cathepsin B contributed to the inflammasome activation in our model, but ROS inhibitors alleviated the IL-1β production.
Conclusions Our results suggest that oxidative stress plays a role in the inflammasome activation in RPE cells upon declined intracellular clearance.

• 1375
Angiogenic potential of orbital adipose derived stromal cells

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Purpose Orbital fat contains adipose-derived stromal cells (ADSC), many therapeutic effects of which have been showed during last years. One line of research is studying of their secretory potential and their role in orbital volume augmentation. It is known that ADSC from subcutaneous adipose tissue secrete some angiogenic and antiapoptotic factors. Nevertheless, there is no information on this, regarding the orbital ADSC. The purpose of this study was to define the secretion of angiogenic factors by orbital ADSC.
Methods Samples of orbital adipose tissue were resected during standard reconstructive and plastic surgery. We isolated orbital ADSC and then collected samples of culture medium on Day 2 and 5 for further quantification of VEGF-A and TGF-ß2 with ELISA.
Results VEGF-A was determined in most samples of culture medium on Day 2. In 4 samples primary negative for VEGF A, this factor was determined on Day 5. In other samples we noticed decrease of VEGF-A concentrations up Day 5 (p=0,025). In samples of culture medium of orbital ADSC from nasal fat pad on Day 2 we detected TGF-ß2, in contrary to the samples from other orbital fat pads. In samples of culture medium primary negative for TGF-ß2, on Day 5 we have noticed the secretion of this factor. There we no significant difference in VEGF-A and TGF-ß2 concentrations in culture medium of orbital ADSC isolated from patients of different age and orbital condition.
Conclusions In vitro orbital ADSC secrete VEGF-A and TGF-ß2. It points out their potential to regulate angiogenesis in orbital tissues and may play positive role at fat transplantation into the orbit.

• 1376
Description of the retinal vascular network by semi-automated computer software (SIVA) in the MONTRACHET study

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Purpose The aim of this study was to identify retinal vascular network patterns using semi-automated software in an elderly population over 75 years in a population-based study, the MONTRACHET (Maculopathy Optic Nerve nuTRition neurovAsCular and HEarT diseases) study.
Methods In 2009-2011, participants from the 3 Cities Study living in Dijon, were proposed to take part in the MONTRACHET study with a complete eye examination. During these exams, color retinal photographs were performed (centered on the optic disc). Semi-automated software (Singapore Institute Vessel Assessment: SIVA) was used in order to describe the retinal vascular network of subjects with a photograph of sufficient quality. All subjects with epiretinal membranes and vascular pathology were excluded. Fifty-four geometric features such as fractal dimension, diameter, tortuosity and branching angle were systematically collected. A principal component analysis (PCA) was used to identify independent patterns.
Results Overall, 1067 photographs were reviewed with SIVA software among the 1153 participants of the MONTRACHET study. The mean age was 79.8 ± 3.8 years and 62.7% were female. After PCA processing, we extracted 3 vascular patterns summarizing 41% of the retinal vascular network information. The first pattern corresponded to a lower density in the vascular network as well as a higher variability in the vascular width (29% of the total variability). The second pattern was highly correlated to large vessels diameters and width. The third pattern matched to an increased tortuosity.
Conclusions In this preliminary study, three vascular patterns were identified: decreased vascular density and heterogeneous network, increased vessels diameter and tortuosity. The next step of this study is to identify associations between these patterns and cardiovascular diseases in this population-based study.

• 1377
Manufacturing of an ocular prosthesis based on the 3D printed anophthalmic socket

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Purpose In anophthalmos, the ideal ocular prosthesis restores the facial appearance and eye motility, and is comfortable to wear. This can best be achieved with a bespoke prosthesis. The initial step usually involves injection of dental impression material to obtain a mould of the anophthalmic socket. However, the socket impression method distorts the soft tissues, so that additional alterations to the prosthesis are required via the trial and error method. Developing an impression-free method of the anophthalmic socket.
Methods A cone-beam CT of the anophthalmic orbit is taken, and with computer-aided design and computer-aided manufacturing (CAD/CAM) the anophthalmic socket is printed three dimensionally (3D). The 3D-printed socket is subsequently used as a trial working prosthesis in the conventional way.
Results With this novel technique, a prosthesis was successfully fitted in a 68-year-old male who had undergone a recent evisceration.
Conclusions Computer-aided design and 3D printing can accurately outline the anophthalmic cavity. Validating the impression-free moulding technique is subjected to further studies.

• 1511

Optimisation of RPE65 gene delivery for treatment of Leber congenital amaurosis patients

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Virally-mediated gene therapy to treat inherited retinal disorders has proven to be safe and well tolerated through a number of phase I/II clinical trials. RPE65 deficiency is the cause of Leber congenital amaurosis type 2 and clinical trials, including our own, using recombinant AAV serotype 2 to deliver the human RPE65 gene into the patients' RPE cells have shown moderate levels of efficacy. We aim to increase the potency and persistence of treatment effect by employing a range of optimisations to the recombinant AAV gene therapy vector. We assessed the preclinical efficacy of a novel gene therapy vector for RPE65 gene replacement ***in vitro*** and ***in vivo*** following optimisation of the viral serotype, transgene promoter and transgene sequence. We observed a 300-fold increase in efficacy in a mouse model lacking Rpe65 when compared to the original AAV2 gene therapy vector. We aim to bring this vector forward for a new phase I/II clinical trial in patients with LCA2.

• 1512

Animal models for ocular gene therapies

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Disease-causing variants of a large number of genes trigger inherited retinal degeneration leading to photoreceptor loss. Because cones are essential for daylight and central vision such as reading, mobility and face recognition, the presentation will focus on a variety of animal models for cone diseases. The pertinence of using these models to reveal genotype/phenotype correlations and to evaluate new therapeutic strategies will bediscussed. Interestingly, several large animal models recapitulate human diseases and can serve as a strong base to study the disease biology and to assess the scale-up of new therapies. Examples of innovative approaches will be presented such as lentiviral-based transgenesis in pigs. The models we will discuss permit to explore common mechanisms existing between different species and to highlight the pathways that may be specific to primates, including human.

• 1513

Novel tissue-targeted localized gene therapy for corneal scarring and neovascularization

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Corneal scarring and neovascularization (NV) due to trauma, injury and/or infection are leading cause of global blindness. This presentation will provide an overview of corneal gene therapy and stipulate novel bench-to-bedside translational strategies for human application. The talk will include information about identified potent adeno-associated virus (AAV) and nanoparticle vectors, simple and minimally invasive vector delivery techniques for delivering genes into desired corneal cells, and defined gene therapy approaches for introducing therapeutic genes selectively into corneal keratocytes or endothelium ***in vivo*** through single application of vector employing customized delivery techniques. Further, talk will discuss cornea-specific mechanisms driving pathologic process, novel molecular targets for interrupting TGFb1 signaling pathways, and therapeutic genes identified from basic-science corneal wound healing investigations performed in my lab laboratory using established small and large animal and donor human corneas. Finally, it will show potential of single- and two-gene combination therapy given locally in the cornea via optimized methods in inhibiting and eliminating corneal scarring and neovascularization ***in vivo*** in preclinical rabbit studies. The optimized gene therapy approaches could be easily applied in a clinical setting, if safety and toxicity are proven.

• 1514

Current gene therapy trials for inherited retinal disorders

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Purpose To discuss the current status of gene therapy for inherited retinal disease.
Methods Data from the literature on gene therapy trials for several inherited retinopathies will be combined with those of the Phase 1, Phase 1 follow-on and Phase 3 trials for ***RPE65***-related inherited retinal disease at The Children's Hospital of Philadelphia, Philadelphia, PA, USA.
Results Gene therapy is capable of improving or stabilizing visual function. According to some recent reports, there is progression of disease in ***RPE65***-related IRD trial participants despite successful subretinal delivery of ***RPE65*** using an AAV2 vector. Other data suggest that there may at least be a decrease in the speed of retinal degeneration, if not stabilization.
Conclusions Gene therapy for inherited retinal disease using viral vectors has demonstrated safety and improvement or stabilization of visual function in some diseases. Whereas disease progression is noted in some ***RPE65***-related IRD trial participants, despite successful application of subretinal gene therapy, others may even have either a stable or slower disease course after treatment.

Conflict of interest
Any research or educational support conditional or unconditional provided to you or your department in the past or present:
Grantee of Spark Therapeutics via The Children's Hospital of Philadelphia

• 1521

Could 24-S-hydroxycholesterol play a role in Müller glial cell's membrane dynamics in the rat

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Purpose The catabolism of cholesterol in neurons leads to a more hydrophilic compound soluble form, the 24-S-hydroxycholesterol by means of an enzyme the CYP46A1.The aim of this study was to analyse the implication of 24-S-hydroxycholesterol (24-S-OHC) on Müller glial cells (MGC) membrane dynamics in the rat.
Methods MGC were grown ***in vitro*** from retinas of 10-day-old Long Evans rats. Cells were treated with 24-S-OHC (treatment) or ethanol (control) for 2 minutes or 6 hours. From twenty millions of MGC in each group, lipid-rafts were obtained after a 1% Lubrol lysis and an ultra centrifugation (180 000g – 20 hours – 4 °C). The following proteins: caveolin, flottilin, connexin 30 and 43, CRALBP, DHAPAT, GFAP and vimentin were analysed using Western blotting on all fractions (lipid-rafts and non-rafts). MGC membrane fluidity was studied ***in vitro*** with two different techniques: anisotropy measurements performed with the lipophilic fluorescent probe TMA-DPH and fluorescence recovery after photobleaching (FRAP) observed using confocal microscopy.
Results 24-S-OHC treatment on ***in vitro*** MGC increased the expression of GFAP and delocalized GFAP in the lipid-raft fraction; 24-S-OHC treatment induced a delocalization of DHAPAT protein out of the lipid-rafts fraction. Anisotropy was decreased with the 24-S-OHC treatment (difference: 5.1 x 10-3; $p < 0.01$) revealing an increase of the membrane fluidity. This increase was confirmed by the FRAP technique, which showed a shorter time of fluorescence recovery for the treated cells.
Conclusions This study showed that 24-S-OHC could be a candidate leading a key role in the activation of MGC, disturbing lipid-raft organization by changing the localization of signalization proteins and increasing membrane's fluidity.

• 1522

Reduced vascular response in patients with normal tension glaucoma in response to hypoxia

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Purpose Increased evidence exists on an association between normal tension glaucoma (NTG) and endothelial dysfunction. Moreover, it is recognized that glaucomatous damage is linked to episodes with hypoxia. The aim of our study was to investigate the vascular response after hypoxia in patients with NTG compared to controls.
Methods The vascular response was evaluated after hypoxia by Peripheral Arterial Tonometry (PAT) and recorded as Reactive Hyperemic Index (RHI). All subjects went through two days of investigation. In random order the first visit included either hypoxia or normoxia with successive measurements. Hypoxia/normoxia was induced in 2 hours through a tightly fitting face mask. Additionally, the peripheral circulation was measured by a thermographic camera. Blood samples were taken before, during and after hypoxia/normoxia to evaluate stress factors such as cathecolamines. The two days of investigation were at least three weeks apart.
Results RHI measurements showed a tendency of greater difference between hypoxia and normoxia in the NTG group. Thermographic images showed a tendency of colder temperatures in the fingertips of the NTG patients before hypoxia compared to the controls. A significant difference in temperature between the hypoxia day and the normoxia day was seen in the NTG group after both two hours of hypoxia/normoxia and half an hour after the mask was removed. Adrenalin levels differed significantly in response to hypoxia in the control group, whereas no significant change was observed in response to hypoxia in patients with NTG.
Conclusions Over all, the vascular response to hypoxia was less prominent in patients with NTG compared to controls. This confirms a decreased ability to regulate the vascular tonus in response to vascular stress (hypoxia) in patients with NTG.

• 1523

Impact of gender-specific differences in corneal elasticity upon IOP measurements using vibration tonometry

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Purpose Vibration Tonometry enables precise non-contact tonometry independently of CCT and post LASIK using induced corneal vibrations response to calculate IOP using different algorithms for men and women. This corneal vibrations response reflects different tissue elasticity between men and women. We calculate IOP error using gender-inverted algorithms: female algorithm for men and vice versa
Methods Vibration Tonometry IOP data from clinical trials in 324 subjects in 3 IOP groups and in 3 age groups. 1040 and 1031 measurements were used respectively in women and in men
Results Using men algorithm for women mean IOP difference was -.376 mm Hg; 0.07 mmHg; 1.937mmHg respectively in the <16 mm; 16-23 mm and in the >23 mm Hg group significantly different $p<0.0001$. In 3 age groups women showed IOP mean difference of -0.086 mm Hg, 0.077 and -0.224 mm Hg respectively in < 50; 50-60 and > 60 yrs old women. Kruskal Wallis test used showed all 3 groups differed significantly $p<0.001$, when compared 2 to 2 the error in the 50-60 group differed significantly from that in >60 yrs old group. For Men mean IOP difference was -.115 mm Hg in the <16 mm group versus 0.385 in the 16-26 mm Hg group and -1.002 in the >23mm Hg group all significantly different (Ttest $p<0.0009$). The 3 age groups in men showed IOP mean difference of -0.129 mm Hg, 0.185 and 0.259 mm Hg (SD= 1.286) respectively in <50; 50-60 and >60 yrs old men. Kruskal Wallis test non significant $p<0.056$, when compared 2 to 2 the error in the <50 group differed nearly significantly from that in >60 yrs old $p=0.025$
Conclusions Gender related difference in IOP measurement is most significant in the higher IOP, >60 yrs old and most significantly in women with higher corneal elasticity . These analyses confirm the important need for gender specific tonometry as uniquely provided by Vibration Tonometry

Conflict of interest
Any Stocks or shares held by you or an immediate relative?:
i Sonic Medical the clinical trial sponsor

• 1524

Temporal macular ganglion-cell inner plexiform layer thinning is a hallmark of early glaucomatous damage

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Purpose To investigate the pattern of damage affecting the GCIPL and to compare it to the topographical RNFL thinning in early glaucoma (EG).
Methods Total Average (Tot Avg) and quadrant (S, I, N, T) RNFL, Tot Avg and sector (ST, S, SN, IN, I, IT) GCIPL thicknesses were acquired with Cirrus SD-OCT in 99 controls, 99 EG, and 50 severe glaucoma (SG) patients. S/I Avg and N/T Avg RNFL, T Avg and N Avg GCIPL thicknesses were also calculated. AUCs were obtained for each parameter. ANCOVA was used to study the changes occurring to couples of rNFL/GCIPL sectors according with VFMD. RNFL and GCIPL sectors were compared normalizing the raw values to their sector's dynamic range (the interval between mean sector thickness in controls (max) and minimum sector thickness in SG (floor)), using the following equation: (sector thickness–floor)/(max–floor). The relationship between VFMD and S RNFL/ST GCIPL or I RNFL/IT GCIPL normalized thicknesses was investigated with linear regression analysis.
Results GCIPL and RNFL sectors were thinner in EG and SG than controls (ANOVA, $P<0.001$). In the EG group T Avg GCIPL was thinner than N Avg GCIPL ($P<0.001$). S/I Avg rNFL had a higher AUC compared to Tot Avg ($P=0.001$) and N/T Avg rNFL ($P<0.001$). Similarly, T Avg GCIPL had a higher AUC (0.936) compared to Tot Avg GCIPL ($P=0.019$) or N Avg GCIPL ($P<0.001$). T Avg and N Avg GCIPL slopes against VFMD were significantly different ($P<0.001$) in EG (VFMD ≥–6dB), but not in SG (VFMD <–6dB, $P=0.79$). In EG, the slopes against VFMD were not statistically different for ST GCIPL vs. S RNFL ($P=0.258$) and for IT GCIPL vs. I RNFL ($P=0.164$).
Conclusions Temporal macular GCIPL thinning is a hallmark of early glaucomatous damage along with S/I peripapillary RNFL thinning. Conversely, nasal GCIPL sectors are relatively spared in EG, resembling a pattern of damage more typical of N/T peripapillary RNFL.

• 1526

Primary Open Angle Glaucoma treated by High Intensity Focused Ultrasound (HIFU). Results at 18 months of a prospective pilot study on patients treated with the 2nd generation probe

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Purpose To assess the safety and efficacy of Ultrasound Ciliary Plasty (UCP procedure) using HIFU (high intensity focused ultrasound) with a second-generation probe which increases the treatment surface area and the firing duration in patients with primary open angle glaucoma.
Methods Prospective clinical series performed in two University Hospitals, on twenty eyes of twenty patients with primary open-angle glaucoma, treated with the EyeOP1 medical device equipped with six miniaturized cylindrical piezoelectric transducers of a new generation with an increased lesion volume. All eyes were treated with an 8-second exposure time per transducer. The main assessment criteria were safety and efficacy measured by the incidence of complications and IOP reduction. Ophthalmic examination and ultrasound biomicroscopy were performed before treatment and during clinical follow-up at D7, M1, M3, M6, M12, M18 and M24.
Results No major intra- or post-operative complications were observed during follow-up period. Clinical examination showed no lesions of ocular structures other than the ciliary body and no or few signs of intraocular inflammation after treatment. The mean intraocular pressure was significantly reduced from 29.1 ± 5.4 mmHg before treatment to 17.8 ± 6.2 mmHg at last follow-up. Five patients have needed a second ultrasound procedure and two patients a third procedure. With a mean follow-up of 18 months, success rate, as defined by an IOP reduction >20% after one or more UCP procedures was 67%. The mean IOP reduction achieved in responding patients was 44%.
Conclusions Coagulation of the ciliary body using high intensity focused ultrasound carried out with the new-generation of miniaturized transducers is a simple, well-tolerated procedure which enables to significantly reduce the intraocular pressure in patients with Open Angle Glaucoma.

Conflict of interest
Any financial support like travel accomodation hospitality etc provided to you or a member of your staff or an accompanying person?:
EYETECHCARE

• 1527

High-intensity focused ultrasound cyclocoagulation: a 6-month study

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Purpose To evaluate the safety and efficacy of high-intensity focused ultrasound (HIFU) cyclocoagulation in reducing intraocular pressure (IOP) in patients with glaucoma by using a novel miniaturized delivery device (EyeOP1) after 6 months of follow up.
Methods This was an interventional study of 61 eyes of 61 patients with glaucoma. The first series of 39 patients did not receive Pilocarpine before intervention and the second series of 22 patients received Pilocarpine before intervention. All eyes were treated with 6 activated transducers operating at 21 MHz with a duration of 8 seconds. A complete ophthalmic examination was performed before the procedure and at day 1, week 3, month 3 and 6 after the procedure. Primary outcome was to evaluate intraocular pressure (IOP) at 3 and 6 months. Secondary outcomes were to assess intra- and postoperative tolerance, visual acuity, medication use, complication rates and re-interventions.
Results IOP results of months 3 and 6 will be available at November 2016. Due to increased pupil distortion and astigmatism in the first series, a second series with the use of preoperative Pilocarpine was performed. In this series, pupillometry was also performed pre - and postoperatively.
Conclusions The current study investigates the influence of preoperative Pilocarpine on the safety outcomes of this procedure.

• 1528

A comparison of visual field testing with a new automated perimeter, the Compass visual field analyser, and the Humphrey visual field analyser

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Purpose To compare a new visual field analyser, Compass, that included an eye tracking and scanning ophthalmoloscopy to Humphrey visual field analyser (HFA).
Methods Prospective cross study design.
Patients were included after a complete examination : all were indemn of ocular disease except glaucoma. Visual acuity was 20/20 for each eye and spherical equivalent ranged from +3 to -3 D.
Patients were randomly assigned to one instrument. HFA was performed with a 24-2 SITA standard strategy comparable to the Compass 24-2 ZEST strategy. Both eyes were tested and 30 minutes after where screened with the other instrument.
MD, PSD and exam duration were compared for both devices using a Wilcoxon signed-rank test. Agreement was evaluated with a Bland-Altman graph for each parameter.
Results The study included 67 eyes of 30 patients. This population was decomposed as : 13 normal eyes, 28 OHT or glaucoma suspect and 26 glaucoma. Patients' demographics were (mean±SD) : age 66,3±13,0 years, pachymetry 527,6± 28,95 µm, axial length 23,73±0,99 mm, spherical equivalent -0,004±1,3 D. 65 HFA vs 62 compass visual fields were reliable (ns). Mean Deviation was equivalent for HFA and Compass instruments : -1,6±2,6 vs -1,4±2,8 dB (p=0,28). Pattern Standard Deviation was significantly higher for the Compass 3,9±2,4 vs 2,4±1,9 dB for the HFA (p<0,0001). Examen duration was also longer for the Compass 351±83 s vs 318±48 s for the HFA (p=0,0164). Bland Altman plots showed a good agreement between HFA and Compass.
Conclusions This study shows that MD and failure rate were comparable between both instruments, PSD and examination duration were slightly higher for the Compass. Agreement was good between both instruments.
As most of the patients included had already performed a HFA before, this may explain the duration difference between and should be consider in further explorations.

• 1531

Inflammatory versus non-uveitic serous/exudative retinal detachments

GUPTA V
India

Abstract not provided

• 1532

Central serous chorioretinopathy misdiagnosed as posterior uveitis

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Central serous chorioretinopathy (CSCR) is a common disease characterized by serous detachment of the neurosensory retina and/or retinal pigment epithelium that often involves the macula. Atypical and chronic or recurrent forms of CSCR may be overlooked or misdiagnosed as chorioretinal inflammatory conditions, including Vogt Koyanagi Harada disease, sympathetic ophthalmia, posterior scleritis, multifocal choroiditis, serpiginous choroiditis, idiopathic posterior uveitis, or other uveitic entity that all usually require corticosteroid treatment. The use of systemic corticosteroids in such cases is not only ineffective, but it usually exacerbates the condition, leading to bilateral, severe, and chronic CSCR with irreversible chorioretinal damage and visual impairment.
A careful clinical examination and appropriate use and interpretation of multimodal imaging are mandatory to differentiate CSCR from any chorioretinal inflammatory condition and to prevent severe and irreversible visual damage resulting from misdiagnosis and management mistakes.

• 1533

Central serous chorioretinopathy complicating inflammation suppressive treatment

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Central serous chorioretinopathy (CSC) can sometimes be mistaken for posterior uveitis. Its diagnosis is of utmost importance as CSC as failure to do so will worsen when steroid therapy is erroneously given. The situation is even more tricky when CSC is complicating IST including steroids given for uveitis. In a collective of 1739 patients seen from 1995 to 2014 at the COS, 16 patients (0.9 %) with CSC were misdiagnosed as posterior uveitis of which the development of CSC was missed in 4 uveitis patients under IST including corticosteroids. The mean diagnostic delay in the latter group was 2.4±1.9 months, substantially shorter than the group of patients misdiagnosed at the onset (56.3±60.6 months). The key to rapid diagnosis of a decrease of VA due to CSC in uveitis, is to search on one side whether inflammatory parameters such as laser flare photometry and dual fluorescein (FA) and indocyanine green angiography (ICGA) are improving combined with the search of CSC signs including serous detachments and/or small PEDs on OCT as well as typical CSC angiographic signs on dual FA/ICGA angiography. Although CSC complicating uveitis treatment is rare, prompt diagnosis is of utmost importance to avoid deleterious consequences.

• 1534

Primary vitreo-retinal lymphoma, an increasing pseudo-uveitis to be taken into account

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The clinical assessment of most of vitreo-retinal (VR) inflammations is often challenging: the clinical picture of such diseases can be overlapping and, despite the advances in medical technologies, the routine diagnostic tools might not provide conclusive data . The term "Masquerade Syndrome" was first used in 1967 to describe a case of conjunctival carcinoma that mimicked a chronic conjunctivitis. Masquerade syndromes are disorders that occur with intraocular inflammation and are often misdiagnosed as a chronic resistant, non-infectious uveitis. Very often mesquerade syndrome is a synonymous of intraocular lymphoma which can present insidious clinical pictures, which are very often confused. At this point, the possibility to take a vitreous tap via pars plana can help the ocular immunologist to differentiate between different sub-sets of infectious diseases and masquerade syndrome. The possibility to test the interleukines' (IL) ratio and to analyze the cytology represents a great scientific advance. Once there is the evidence of a masquarade syndrome, the urgent referral to the hematologist is mandatory, in order to start an appropriate and prompt chemotherapy, both local and systemic.

• 1535

Inflammatory versus non-uveitic posterior segment diseases in paediatric patients

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Abstract not provided

• 1541

Visual function response to ocriplasmin for the treatment of vitreomacular traction: results from the oasis study

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Purpose The effect of an intravitreal ocriplasmin-injection on vitreomacular adhesion (VMA) resolution was investigated in a phase 3b randomized, sham-controlled, double-masked, multicentre study. The objective of this analysis was to assess the effect of ocriplasmin on patient-relevant visual function outcomes.
Methods Prespecified analysis of secondary endpoints in the OASIS study. A total of 220 participants with symptomatic VMA/VMT were enrolled, of whom 146 received a single IVT-injection of 125µg ocriplasmin and 74 a sham-injection. Visual function response (VFR) was defined as either a VA improvement of ≥2 lines or an improvement exceeding the minimal clinically important difference (MCID) in the composite score or the VFQ-25 mental health subscale score of the Visual Function Questionnaire (VFQ-25). The MCID was estimated using the standard error of measurement approach. The main outcome measure was the VFR at 6 months, with further assessments at month 12 and 24.
Results The MCID was estimated at 3.71 points for the VFQ-25 composite score and 10.71 for the VFQ-25 mental health subscale score. VFR occurred in 51.0% of ocriplasmin vs. 23.3% of sham subjects (P=0.0001). The VFR was maintained through months 12 and 24: 53.1% and 50.3% in ocriplasmin vs. 21.9% and 20.5% in sham subjects, respectively (p<0.0001).
Conclusions Treatment with ocriplasmin compared with sham resulted in a significant improvement in VFR. The 6-month treatment effect was sustained at month 12 and 24.
Conflict of interest
Any research or educational support conditional or unconditional provided to you or your department in the past or present?:
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• 1542

Functional and anatomical changes after standard and half dose verteporfin PDT in central serous choroidopathy

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Purpose To report the anatomical and functional changes occurring in patients with central serous choroidopathy (CSC) treated by standard or half dose photodynamic therapy (PDT) with verteporfin.
Methods Retrospective, interventional, multicenter study. The clinical files, optical coherence tomography (OCT) and autofluorescence (AF) images of patients with CSC treated by standard or half dose PDT were revised.
Results A total of 152 patients were identified (111 males). Patient's mean age was 50 years (standard deviation 10, range 30-68) and the average follow-up was 21 months (SD 12, range 3-54). Mean baseline corrected visual acuity (VA) was 64 ETDRS letters (SD 18, range 2-85) and final VA was 72 letters (SD 16, range 2-85). The average central macular thickness (CMT) determined by automated OCT software at baseline was 293 µm (SD 85, range 115 to 615) and 221 µm (SD 45, range 41 to 615) by the end of follow up. Eighty-two patients were treated by standard, full dose PDT and 70 patients were treated by half dose verteporfin PDT. The average number of required PDT sessions was 1.13 (SD 0.47, range 1-4) for standard PDT vs. 1.30 (SD 0.52, range 1-3) for half dose PDT (p=0.009; Student´s t test for unpaired data). Both groups did not differ in terms of age, previous lapse since diagnosis, baseline VA, final VA, and final CMT (p=0.72; p=0.18; p=0.41; p= 0.30; p= 0.85; Student´s t test for unpaired data). However, they differed in terms of basal CMT (mean CMT in the standard PDT group was 320µm vs. 262µm for the half dose group). The PDT laser spot could not be observed in the AF images in any of the groups.
Conclusions According to our findings, standard, full dose PDT provides similar visual outcomes as half dose verteporfin PDT with a lower rate of re treatments and no differences in CMT or AF patterns.

• 1543

The retinal macroglia in hypercholesterolemic rabbits: neuroprotective effect of a non-lipid-lowering statin dose

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Purpose To evaluate the pleiotropic effects of low-dose statins in the morphology of retinal macroglia in long-term hypercholesterolemic rabbits and to quantify treatment-induced astrocyte changes.
Methods New Zealand rabbits were split into three groups: Control (G0; n=10), fed a standard diet; Hypercholesterolemic (G1; n=8), fed a 0.5% cholesterol-enriched diet for 8 months; and Statins (G2; n=8), fed a 0.5% cholesterol-enriched diet for 8 months together with the administration of fluvastatin sodium or pravastatin sodium at a dose of 2mg/Kg/day each. Eyes were processed for immunohistochemistry using anti-GFAP. The retinal area occupied by astrocytes was quantified.
Results Müller cells and astrocytes were reactive in G1 and G2. In contrast with G1, no GFAP+ Müller cells forming glial scar-like structures were detected in G2. In comparison with G0: i) the retinal area occupied by astrocytes associated with the nerve bundles was statistically reduced in G1 (p<0.006); however, no significant changes were observed in G2; and ii) the retinal area occupied by perivascular astrocytes in G1 was significantly reduced (p<0.003) due to the disappearance of perivascular astrocytes from the vessels, but significantly increased in G2 (p<0.030), given that perivascular astrocytes did not disappear from the vessels and were reactive.
Conclusions Despite serum cholesterol values remained unchanged, treatment with low-dose statins preserved retinal macroglia. The pleiotropic effects of the statins seem to help to prevent astroglial death induced by hypercholesterolemia.

• 1544

Therapeutic potential of non-viral MRNA delivery to Müller cells for neuroprotection

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Purpose Retinal cell degeneration is a leading cause of vision loss in many ocular diseases. The progressive loss of retinal cells is often hereditary, but rarely monogenic. This enormous diversity in disease-inducing mutations has hampered the development of gene replacement strategies to prevent or reverse retinal degeneration. Therefore interest has augmented for a treatment strategy that halts the degeneration process, rather than correcting the initial causative mutation. This work aims to evaluate the potential of chemically modified mRNA as a therapeutic strategy to stimulate neuronal survival and save vision, regardless of the initial genetic defect.
Methods Evaluation of mRNA delivery to Müller cells was conducted in MIO-M1 cells, using modified and unmodified reporter mRNA encoding the Green Fluorescent Protein (GFP). Lipid-based vectors carrying the mRNA were delivered to Müller cells via serum-containing medium or injected into fresh bovine vitreous, applied on top of the cells. In both setups uptake, level and duration of eGFP expression and toxicity of the lipoplex formulations were evaluated. In addition, the suitability of these complexes for intravitreal injection was assessed by measuring their mobility in bovine vitreous on a single-particle level.
Results Overall transfection levels are decreased in presence of vitreous, indicating that the vitreous is an important barrier for non-viral mRNA delivery to the retina. Chemical modification of the mRNA substantially increased eGFP expression in >80% of cultured Müller cells.
Conclusions Our data demonstrate that non-viral lipid based carriers show good potential to transfect Müller cells ***in vitro***. However, to make these mRNA therapeutics suitable for ocular targets, development of strategies to overcome the vitreal barrier will be crucial to implement ocular mRNA therapy in the future.

• 1545

Anti-VEGF therapies for retinal vein occlusion: real-world outcomes of a Portuguese multi-center study

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Purpose We aim to characterize real-world treatment patterns in patients with retinal vein occlusion (RVO) treated with anti-VEGF in Portugal and evaluate the visual acuity and tomographic outcomes.
Methods Retrospective, observational multicenter study of Portuguese patients with center-involving macular edema secondary to RVO treated with anti-VEGF as primary treatment and with a follow-up of 12-months. Hemiretinal vein occlusion was analyzed within the BRVO group.
Results Two hundred eyes were analyzed: 62% with BRVO and 38% with CRVO; 50% of patients were male and the mean age was 69 years. The median visual acuity (VA) gain was maximal at 6 months: -0.2 logMar (2-line gain) and -0.1 logMar (1-line gain) for the BRVO and CRVO groups respectively. This improvement was maintained throughout the follow-up ($p<0.05$ in 0-6 and 0-12 months period in both groups). The central macular thickness (CMT) decreased from 535 µm to 333 µm at 6 months in the BRVO group and from 693.5 µm to 404 µm in the CRVO group. At 12 months no further improvement was seen($p<0.05$ in 0-6 months period and in 0-12 months period in both groups). The mean change of CMT was not statistically different between groups in neither time point. The median number of injections was 3 in the first 6 months and 1 in the following six in both groups. A better VA outcome was associated with younger age, higher initial VA and a lower baseline CMT in both groups ($p<0.05$).
Conclusions Real-world outcomes of anti-VEGF treatment for RVOs are usually worse than those obtained in the landmark clinical trials in functional and morphological parameters. This could be due to less intense treatment but also because clinical trials usually exclude patients with poor baseline characteristics. Our results are in accordance with other real-life studies and confirm a better prognosis of BRVO in comparison with CRVO.

Conflict of interest
Any consultancy arrangements or agreements?:
RITA FLORES: CONSULTANT: ALIMERA, ALLERGAN, BAYER, NOVARTIS
SARA VAZ-PEREIRA: CONSULTANT: BAYER AND NOVARTIS

• 1546

Incidence of macular oedema following pan-retinal photocoagulation using a multi-spot semi-automated pattern-scanning laser in one sit versus 4 monthly sits in mild proliferative diabetic retinopathy or pre-proliferative diabetic retinopathy

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Purpose To compare the central retinal thickness (CRT) 9 months after a pan retinal photocoagulation (PRP) with a multi-spot semi-automated pattern-scanning laser (PASCAL) in one sitting (1S-PRP) vs four monthly sitting (4S-PRP) for diabetic retinopathy.
Methods Prospective multicenter randomized study carried out between October 2011 and November 2015, including patients with a mild proliferative diabetic retinopathy or a pre-proliferative diabetic retinopathy (DR). Patients with best-corrected visual acuity (BCVA) under 54 letters ETDRS (Early Treatment Diabetic Retinopathy Study) and CRT ≥ 350 mm were excluded. DR was treated by PRP with at least 3000 burns given with a PASCAL laser either in one session or in four monthly sessions. Each patient underwent a complete ophthalmologic exam including an assessment of BCVA, a 9 fields retinophotography and a Spectral-Domain Optical Coherence Tomography (SD-OCT) macular imaging at baseline and at one, two, three, six and nine months after inclusion.
Results Eighty one eyes of 81 patients were included with a median age of 56 years [IQR : 47.0 ; 66.0]. The mean CRT and median BCVA did not significantly differ between both groups during all the follow-up and especially at 9 months (285mm [273.5; 304.0] in 1S-PRP vs 291mm [275.5; 313.0] in 4S-PRP, p=0.27 / 82 letters [76.8; 87.3] vs 82 letters [75.3; 87.0], p=0.76). A positive effect on DR at 9 months was observed in 32 (84.2%) of eyes in the 1S-PRP group vs 27 (75.0%) of eyes in the 4S-PRP group (p=0.39). The 1S-PRP strategy was nearly 2 times shorter and less expensive (22 minutes [17.5; 30.5], 471€/patient) compared with the 4S-PRP strategy (43 minutes [37.0; 59.5], p<0.001, 775€/patient).
Conclusions Our study showed the non-inferiority of the PRP in 1 sitting versus 4 monthly sittings in term of CRT and the medico-economic interest of a single session PRP.

• 1551

Reduced post-illumination pupil response in patients with mild-moderate cataracts is associated with impaired sleep quality

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Purpose Cataracts absorb light, especially in the blue-range of the visible light spectrum, and reduce retinal illumination.Recent studies showed improved sleep and faster reaction times following cataract extraction.These non-visual benefits are perhaps due to increased blue light transmission and melanopsin-dependent photoreception.We compared visual function, pupil responses, sleep quality and sleep-wake cycle in patients with cataracts and controls
Methods 30 patients with cataracts and 22 age-matched pseudophakic controls were tested during the winter season.Ophthalmologic examination with automated perimetry and optical coherence tomography was performed. Pupil responses were recorded to a 1s red or blue light having pre-selected intensities.All participants completed a questionnaire for subjective sleep quality(Pittsburgh Sleep Quality Index; PSQI).They were asked to maintain a regular sleep-wake rhythm with approximately 8 hours of sleep.Rest -activity cycles were recorded for one week by wrist worn activity watches
Results Mean acuity was 1.0 ± 0.1 for both groups.The pupil contraction amplitude to dim blue light and the post-illumination pupil response to bright blue light were significantly reduced in patients with cataracts ($p<0.05$).This was associated with a significantly higher PSQI score relative to controls ($p=0.02$), indicating impaired sleep, and a lower post-illumination response to bright blue light ($R=0.43$; $p<0.05$).Sleep analysis from the activity watches revealed a significantly lower sleep efficiency in cataract patients than in controls (78.6 ± 8.3 vs. 83.2 ± 4.5;%; mean ± SD; $p=0.02$)
Conclusions Patients with cataracts, not visually impaired, demonstrate reduced melanopsin activity, as assessed by the pupil response. This latter is correlated with impaired subjective sleep quality and greater sleep fragmentation

• 1552

Consensus on guidelines for idebenone administration in Leber's hereditary optic neuropathy (LHON)

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Purpose To reach a consensus on guidelines for diagnostic and clinical management including idebenone administration in Leber's hereditary optic neuropathy (LHON). Idebenone has recently received provisional approval by the European Agency of Medicine (EMA) with the indication of LHON.
Methods A consensus international meeting was held in Milan, Italy, on 17th March 2016, with the participation of a study group of 15 invited experts in the field of mitochondrial optic neuropathies, with particular interest and expertise in LHON. The group discussed and voted 19 statements, mostly oriented at defining disease stages, clinical and diagnostic criteria, and precise guidelines for idebenone administration with four choices 1) Disagree 2) Partially disagree 3) Partially agree 4) Agree.
Results The key result was the agreement on treating with idebenone 900 mg/day all patients with subacute/dynamic stage of disease (<6 months from onset and 6-12 months from onset), starting as soon as possible. However, there was not sufficient evidence for recommending treatment in chronic patient between 1 and 5 years, and no evidence at all to recommend treatment in chronic patients with more than 5 years of disease duration. Furthermore, in subacute/dynamic patients the treatment should be continued for at least 1 year in order to assess response, and if the outcome is favorable and clinically relevant, the treatment should be continued after plateau for 1 more year. Last, treatment was unanimously not recommended for asymptomatic relatives of LHON patients, whereas lifestyle counseling was suggested.
Conclusions The consensus, after extensive debate, defined a series of recommendations without being unanimous in most cases, in consideration of evidence-based idebenone administration in LHON.

Conflict of interest
Any consultancy arrangements or agreements?:
Santhera, GenSight, Edison Pharmaceuticals, Stealth Peptides

• 1553

Relationship between immune response and ocular inflammation after intravitreal injection of rAAV2/2–ND4 (GS010) in Leber Hereditary Optic Neuropathy (LHON) patients

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Purpose rAAV2/2-*ND4* vector (GS010), under development by GenSight-Biologics as a treatment for vision loss in LHON patients bearing *ND4* mutation, is administered via intravitreal injection (IVI). Immune response to intraocular AAV administration may impact safety and efficacy of AAV-delivered ocular gene therapy. We investigated the relationship between systemic anti-AAV2 antibody levels pre- and post-IVI and ocular inflammatory reactions after GS010 injection.
Methods Fifteen LHON-*ND4* patients (Phase I/IIa; ClinicalTrials.gov NCT02064569) underwent IVI of GS010 with four escalating dose levels (9E9; 3E10; 9E10; 1.8E11 vg/eye). Ocular examinations were performed up to 48 weeks. Serum anti-AAV2 IgG were quantified by ELISA and Neutralizing antibodies (Nab) were quantified using a seroneutralization luciferase cell-based assay. The complete data at 48 weeks will be presented
Results At baseline, NAb levels in serum were undetectable in 7 patients and above 1:1000 titer for 2 . After two weeks, IgG titers increased up to 19 times baseline levels in 7 patients and NAbs up to 39 times in 10. At week 8, NAb titers remained above 1:1000 titer for 6 patients; then titers tended to decrease progressively overtime. 13 patients experienced mild to moderate ocular inflammation (anterior chamber and/or vitritis), that resolved with standard therapy, without apparent correlation with the humoral serum response.
Conclusions A humoral serum response against AAV2 was observed from 2 weeks post-injection of GS010 in LHON patients. Ocular inflammation was reported, with no consistent correlation with anti-AAV2 antibody levels and non-detectable impact on pharmacodynamics trends. Additional follow-up of humoral and cellular immunogenicity in Phase III trials will confirm these observations and delineate the potential predictable impact for contralateral eye injection.

Conflict of interest
Any consultancy arrangements or agreements?:
Consultant and Principal investigator of the study (Gensight sponsor)

• 1554

Factors affecting the prognosis of visual acuity and visual fields in pituitary adenoma patients treated with endonasal endoscopic transsphenoidal surgery

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Purpose The objective of this study was to evaluate visual acuity (VA) and visual fields (VF) quantitatively before and after endonasal endoscopic transsphenoidal surgery (EETS), with special attention to the prognostic factors such as the tumors' suprasellar dimension (SSD) and volume.
Methods A total of forty-seven patients with pituitary adenomas operated by EETS were retrospectively evaluated. VA, VF and visual impairment score (VIS) calculated from VA and VFs were determined pre- and postoperatively. Tumors' SSD and chiasmal contact were evaluated and correlation of tumor volume and SSD with pre- and postoperative visual function (VA, VF and VIS) was assessed.
Results VA improved in 42% of eyes (n=21) after EETS and 79% (n=38) had normal VA postoperatively. Postoperative recovery in VF was observed in 86.5 % (n=32) eyes with VF defect. Mean VIS change was 11.6 (95% CI 7.3-16.0) and it improved in 96.0 % of the patients (n=24) with preoperative visual impairment. The mean SSD in patients with VF defect (n=20) was 16.3 mm (95% CI 13.2-19.3) and in patients with no VF defects (n=23) 7.5 mm (95% CI 5.9-9.2) ($p<0.001$). A cut-off value of 10 mm for visual perturbations was determined for SSD and 5.1 ml for tumor volume ($p<0.001$ for both). A significant correlation between the tumor's SSD and volume with pre- and postoperative visual function was found.
Conclusions The visual outcome after EETS for pituitary adenomas was excellent and significant complications were rare. The size (suprasellar dimension and volume) of pituitary adenoma was the most important predictor of visual outcome after EETS.

• 1555

Neuro-ophthalmological manifestations of Behcet's disease

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Purpose Behcet's disease (BD) is an inflammatory disease characterized by recurrent oral aphthous ulcers (major criteria), genital ulcers, uveitis and skin manifestations (minor criteria). Neuro-ophthalmological manifestations (NOM) are rare. The aim of our study is to report the spectrum of NOM of BD, and evaluate their prognosis.
Methods Medical records of patients with neuro-Behcet, seen in a single tertiary center between 1987 and 2015 were retrospectively reviewed. Patients with NOM were included in the study. The diagnosis of neuro-behcet disease was based on neuro-imaging and lumbar puncture. All patients were evaluated both in the internal medicine and ophthalmology departments.
Results Out of the 217 patients diagnosed with neuro-BD, 29 presented with NOM. The M/F ratio was 1.2. Mean age at diagnosis was 25.3 years. Clinical NOM included papillitis (27.5%), papilledema (51.7%), retrobulbar optic neuritis (10.3%), optic disc atrophy (31%) and cranial nerve palsy (27.5%). All patients were treated with corticosteroids and immunosuppressive drugs were required in 23 patients. Initially, 79% of patients had a decreased visual acuity, and 79% had visual field defects. After treatment, vision improved or stabilized in 66.7% and worsened in 33.3%. The mean ±SD LogMAR visual acuity improved from 0.4±0.3 at diagnosis to 0.2±0.3 after therapy. 10.3% and 3.4% patients were respectively legally blind at diagnosis and at the end of follow-up.
Conclusions Although NOM of BD are rare, they are potentially severe and disabling. Recognition of NOM is crucial for establishing an early diagnosis. Prompt treatment is the main prognostic factor for the visual outcome for these patients.

• 1556

Visual outcomes of fractionated radiotherapy in optic nerve sheath meningioma

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Purpose Optic nerve sheath meningioma (ONSM) is a rare benign tumor of the optic nerve sheath that can lead to blindness if untreated. We conducted a retrospective monocentric study to assess the effect of radiotherapy on tumor control and visual outcomes in patients with ONSM.
Methods All patients diagnosed with ONSM at our centre were reviewed and data on: symptoms at presentation; visual acuity (VA), color vision and visual fields (VF); treatment type; visual outcome if treated with radiotherapy were recorded.
Results There were 34 (26 female) patients reviewed. Presenting symptoms were decreasing vision (25 patients), subjective scotoma (4 patients), transient visual obscuration (4 patients), disturbance of color vision (1 patient), diplopia (4 patients), exophthalmia (3 patients), palpebral edema (2 patients), tearing (2 patients), conjunctival hyperaemia (2 patients), pain (8 patients) and headaches (3 patients). Median initial VA was 0.1 (interquartile range (IQR) 0 to1)logMAR, color vision was 1 (13 plates) and VF mean defect was 7dB. 16 patients were treated with fractionated radiotherapy (total 50.4Gy/28 sessions) between 2002 and 2015. After radiotherapy, VA improved in 13 eyes, was unchanged in 1 eye and decreased in 2 eyes. Median best-corrected VA improved from 0.1(IQR) (0 to 0.4)logMAR to 0 (-0.1 to 0)logMAR, color vision improved from 5 (0 to 12) to 12 (1 to 13), and median VF mean defect improved from 10 (5 to 19)dB to 4 (1 to 10)dB. Tumor size was reduced in 3 patients, and stable in 11 patients (not available in 2 patients). No adverse side-effects were reported during the time of follow-up.
Conclusions Fractionated radiotherapy is a safe procedure and can be used to treat patients with ONSM. In our study, visual improvement was observed in 13 (81%) eyes and visual loss in 2 (12.5%) eyes.

• 1557

Automated evaluation of peripapillary choroidal thickness in nonarteritic anterior ischemic optic neuropathy

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Purpose To compare peripapillary choroidal thickness (PTC) between eyes with nonarteritic anterior ischemic optic neuropathy (NAION), contralateral uninvolved eyes and masked healthy eyes by age using the automated choroidal segmentation provided by Swept Source Optical Coherence Tomography (SS-OCT Triton, Topcon, Japan).
Methods 23 eyes with NAION, 15 uninvolved fellow eyes, and 28 healthy eyes were included in this cross-sectional observational study. .Automated choroid segmentation by SS-OCT was performed for a minimum of 6 months after the acute event.
The Bruch´s Membrane Opening based optic nerve area and peripapillary RNFL thicknesses were evaluated using SD-OCT Spectralis (Heidelberg Engineering GmbH, Heidelberg, Germany). The association between PCT and other potential confounding variables including age, gender, axial length, intraocular pressure and disc area was examined using univariable and multivariable regression analyses.
Results The mean PCT in the NAION eyes, unaffected fellow eyes, and control group were 121.91± 69.7 µm , 133 ± 53 µm, and 116.2 ± 47.1 µm, respectively (ANOVA, p= 0.52). All peripapillary RNFL thicknesses (average and regional) were significantly thinner in NAION eyes compared with unaffected and healthy eyes (P= 0.000). Older age was significantly associated with a thinner mean PCT (rho -0.555, P = 0.000).
Conclusions Although controversial regarding PCT in NAION exists in the literature using manual measurements, in the current study automated analysis did not find any significant differences in NAION eyes compared to both unaffected fellow eyes and control eyes.

• 1561

The Soft Shell Technique To Prevent Leakage of Perfluorocarbon Liquid Into The Subretinal Space

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Purpose Perfluorocarbon liquid (PFCL) can be used to unfold the retina during vitreoretinal surgery. The subretinal migration of PFCL is an undesirable complication of its use in cases with posterior retinal breaks particularly with associated proliferative vitreoretinopathy. The "soft shell" technique, which is the use of hyaluronate (HA) to cover the break, has been described to prevent such migration. Our aim is to assess the scientific basis of this technique.
Methods A porcine retina model with two holes on a transwell was used to mimic the retinal breaks ***in vivo***. HA solution was used to cover one of the holes. Perfluoro-n-octane (PFO) was added on top of the retina model incrementally using a syringe pump. The liquid level of PFO required to cause rupture of the PFO/aqueous interface with or without the HA coating at the two holes was measured. The interfacial tensions between the PFO against water and against HA solution with different aqueous concentrations were measured using pendant drop analysis.
Results The interfacial tension between PFO and aqueous with HA coating (68.3±1.29 mN/m) is statistically significant higher than the PFO/aqueous interface without hyaluronate (37.4±3.40 mN/m) ($p< 0.05$). A higher PFCL level is required to cause the rupture of the PFO/aqueous interface at the hole with HA coating.
Conclusions A greater hydrostatic pressure is needed to rupture the PFO/aqueous interface in the presence of HA coating at the break. The increase may due to the increase in interfacial tension at the interface. This study provides the scientific explanation how the soft shell technique may work.

• 1562

Incidence and risk factors of cystoid macular edema after retinal detachment surgery

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Purpose To evaluate the incidence rate of cystoid macular edema (CME) after uncomplicated primary operation on retinal detachment (RD) and to identify risk factors associated with postoperative CME.
Methods Retrospective interventional case series of consecutive patients that underwent one RD repair either by primary vitrectomy or external procedure during a 3 years period starting on January 2012. Postoperative CME was defined as poor visual recovery associated with intraretinal hyporeflective cysts on optical coherent tomography scans (OCT) engendering central macular thickening.
Results A total of 403 eyes were studied with a mean follow-up of 6 months. The incidence of CME was 7% after pars plana vitrectomy (22/317 eyes) and 2,3% after external procedure (2/86 eyes). Risk factors for CME were : a smaller axial length ($p<0.005$), a higher duration of macular detachment ($p<0.029$), a lower visual acuity at presentation ($p<0.022$), an history of posterior capsular rupture ($p<0,01$) and the use of cryopexy during surgery ($p= 0.035$). After 6 month follow-up CME persisted in 12/24 patients. Mean visual acuity was 0.28 logMAR in eyes without CME versus 0.4 logMAR in eyes with persistent CME.
Conclusions The incidence of CME after RD repair was 7% after primary vitrectomy, and 2.3% after primary scleral buckling. Patients might benefit from increase use of OCT during follow-up of retinal detachment surgery to detect macular pathology. Visual prognosis was good in 50% patients.

• 1563

Retinal toxicity of intraocular silicone oil. A retrospective study

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Purpose To determine the relation between the use of silicone oil (SO) as an intraocular tamponade and the incidence of unexplained loss of visual acuity.
Methods A retrospective study of 175 patients who underwent SO removal at Department of vitreo-retinal surgery at Centro Hospitalar São João between January 2012 and June 2015.
Results Nine patients (5.1%)(4 male, 5 female), with a median age of 57 years (range 31 to 84 years) reported reduction of vision of unexplained cause after SO extractions. The median time of SO fill was 8 months (range 4 to 21 months). Patients with 2 or more lines of vision loss of unexplained cause after removal of silicone oil (ROSO) showed a mean drop of visual acuity of 0.2. The intraocular pressure (IOP) became elevated in 7 (77.8%) eyes during the follow up period. Only 2.9% of patients who underwent ROSO had cataract as a complication.
Conclusions There is a 5.1% overall incidence of unexplained loss of vision in eyes following SO removal, with a high rate in women (55.6%). The main complication observed was ocular hypertension.

• 1564

Heads-up eye surgery: pros and cons

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Purpose To evaluate the use of Heads-up approach for eye microsurgical procedures.
Methods The Heads-up system TrueVision 3D Surgical (Santa Barbara, CA, USA) combined with operating microscope Lumera 700 (Carl Zeiss Meditech, Oberkochen, Germany) was used during the surgeries on anterior and posterior segment of the eye by two experienced surgeons. The time that was necessary for getting used to the heads-up surgery was assessed. The magnification and the colours on the screen were compared with those seen through the ocular of the microscope. The surgeon's posture using standard oculars and heads-up system was assessed and compared as well.
Results The first surgery performed by each surgeon was fully done with he use of heads-up system. The duration of the first 2 surgeries was approximately 15-20 minutes longer comparing to the standard approach. The duration of every next surgery was shorter and finally on the 5th surgery didn't differ from the one done with standard approach. The colours on the 3D display were different from those seen through the oculars, but it was possible to do the digital adjustment of the colours. The magnification of the ocular structures with 3D system was bigger comparing to the magnification in standard oculars. The posture of the surgeon was more flexible during the surgeries with 3D system.
Conclusions New 3D technology allows the surgeon to work with the bigger magnification and in more relaxed position. The colours of the ocular tissues with 3D system differ from the colours seen through the standard oculars, but can be adjusted by the special software. Heads-up surgery necessitates a learning curve, which is relatively short.

• 1565

Vitreous and subretinal VEGF levels in fresh rhegmatogenous retinal detachment

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Purpose To explore the levels of vascular endothelial growth factor (VEGF) in vitreous and subretinal fluid in eyes with rhegmatogenous retinal detachment.
Methods Overall 16 eyes of 16 patients (mean age, 49) with fresh rhegmatogenous retinal detachment were included into this study. There was no systemic or ocular disease other than the retinal detachment that might contribute to results in the patients. Vitreous samples (n=9) were obtained during pars plana vitrectomy whereas subretinal fluid samples (n=7) were obtained via external drainage during encircling sclera buckle surgery. Serum and vitreous VEGF levels were analyzed using enzyme-linked immunosorbent assay. Total vitreous or subretinal fluid proteins and total serum proteins were also measured. Mann-Whitney U and Spearman correlation tests were performed to compare the VEGF concentrations.
Results Median VEGF level was found higher in subretinal fluid when compared to vitreous (545.80 pg/mL versus 106.08 pg/mL, P=0.05). The difference was still significant after adjusting the results with total protein (P=0.05). Subretinal fluid VEGF level was similar to serum VEGF level (410.30 pg/mL) in buckling group (P=0.95) while serum VEGF level (221.20 pg/mL) was significantly higher than that of vitreous in vitrectomy group (P=0.019). There was no correlation between serum and subretinal VEGF (P>0.05) or serum and vitreous VEGF levels (P>0.05).
Conclusions The retinal pigment epithelium is the major source of VEGF in the eye. The current study confirmed that VEGF level in subretinal fluid is higher than that of in the vitreous in eyes with fresh retinal detachment, most probably due to the retinal pigment epithelium is in closer vicinity to the subretinal fluid, compared to vitreous humor.
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• 1566

Robot assisted retinal vein cannulation in an in vivo porcine retinal vein occlusion model

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Purpose To evaluate the feasibility of robot assisted retinal vein cannulation for retinal vein occlusion.
Methods Prospective experimental study performed in in vivo porcine eyes. A standard three port pars plana vitrectomy was followed by laser induced branch retinal vein occlusion. Consequently, a retinal vein cannulation with the help of a surgical robot and a micro-needle was performed. Complete success was defined as a stable intravenous position of the needle tip confirmed by blood washout for at least 3 minutes. Secondary outcomes were the occurrence of intraoperative complications and technical failures.
Results Cannulation was successful in 15 out of 18 eyes with a complete success rate (duration of infusion of more than 3 minutes) of 73,3% after exclusion of 2 eyes from analysis due to failure in establishing a blood clot. There were no technical failures regarding the robotic device. The intravessel injections of ocriplasmin in 2 out of 2 eyes led to a clot dissolution. In a subset of 5 eyes, a second cannulation attempt at the border of the optic disc resulted in a stable intravessel position and infusion during 361,8 (±138,5) seconds.
Conclusions Robot assisted retinal vein cannulation with prolonged infusion time is technically feasible. Human experiments are required to analyze the clinical benefit of this new therapy.

Conflict of interest
Any consultancy arrangements or agreements?:
Peter Stalmans is a consultant for Alcon, Bausch&Lomb, DORC, Nano-Retina and Zeiss.
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Peter Stalmans receives lecture fees from Alcon, DORC, Ellex, Haag-Streit and Thrombogenics.

• 1571

Introduction to Ultrahigh-Resolution OCT

WERKMEISTER R

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Various diseases can have significant effects on morphological and functional aspects of the anterior segment of the eye. These may include alterations in corneal anatomy, i.e. changes in thickness of epithelium and Bowman's layer, structural changes in the anterior chamber and aqueous outflow system or alterations in tear film thickness and tear secretion.

Optical coherence tomography (OCT) is a non-invasive optical imaging modality enabling cross-sectional in vivo imaging of internal microstructure in biological tissues. However, commercially available OCT technology sometimes does not provide sufficient resolution for in vivo visualization of the fine anatomy of the anterior eye segment. In this talk, an ultrahigh-resolution OCT system that is based on a Titanium:Sapphire laser and provides an axial resolution below 2 µm is introduced. It allows in vivo imaging the anatomy of the cornea, limbal and scleral region as well as the structure of the lens with unprecedented richness of detail and resolution. Furthermore, the precorneal tear film can be visualized.

The technology might have considerable potential for both the diagnosis and the investigation of surgical outcome in various ocular diseases.

• 1572

OCT Imaging in Glaucoma and PEX

SAPETA S

Medical University of Vienna, Clinical Pharmacology, Vienna, Austria

Glaucoma, as one of the leading causes of blindness worldwide, can be characterized by abnormalities in the aqueous outflow system (AOS) structures, including Schlemm's canal, that regulate the IOP in a healthy eye. Furthermore, the accumulation of pseudoexfoliation (PEX) deposits in the anterior chamber can increase the risk of the disease. The imaging of the anterior eye segment and here in particular the limbal area and anterior lens capsule could have a special clinical significance, since there is an evidence that symptomatic PEX is preceded by subclinical ultrastructural changes in the anterior segment including the lens surface. In this course, ultrahigh-resolution optical coherence tomography for imaging of the anterior eye segment in glaucoma and PEX patients will be introduced. The advantage of the superior resolution as compared to commercially available OCT technology for visualization of AOS structures and PEX deposits on the lens capsule as well as its potential for evaluation of Schlemm's canal diameter will be shown and possible applications of the technology in clinical practice will be discussed.

• 1573

Imaging of Corneal Lesions and Wound Healing

SCHMIDL D

Medical University of Vienna, Department of Clinical Pharmacology, Vienna, Austria

New techniques, such as ultrahigh-resolution optical coherence tomography allow for the noninvasive, objective assessment of the anterior segment of the eye. It also provides the possibility for longitudinal follow-up of changes in the corneal structure, allowing for monitoring of affected patients. In the present talk, examples for the application of this technique in corneal lesions, such as abrasions or infiltrates, will be given and possible applications in clinical practice will be discussed.

• 1574

Linear and nonlinear microscopy for AS imaging: principles and pathbreaking application

STACHS O

University of Rostock, Department of Ophthalmology, Rostock, Germany

Linear microscopy is an established imaging technology for ocular surface imaging. Nonlinear microscopy is a new non-invasive imaging technique, which allows a visualization of biological tissue with high signal contrast due to spectral separation combined with high resolution. This talk presents the physical principles of different contrast mechanisms. Exemplary experimental results based on various linear and nonlinear signals are shown, opportunities of this technology are discussed and the prospect of translating this imaging technique into a clinical application is addressed

• 1575

Nonlinear microscopy for quantification of riboflavin diffusion in the cornea

HEISTERKAMP A

Laser Zentrum Hannover, Medical Laser Application and Biophotonics, Hannover, Germany

Imaging methods are a central part of diagnostics and therapeutic procedures at the anterior segment of the eye. Due to the good accessibility, even high resolution laser scanning technologies are applicable, delivering cellular resolution images of living cells and tissues of the cornea. Using different nonlinear imaging modalities, even diffusion processes at the cornea can be monitored.
Using a scanning laser microscope in combination with a tunable optical parametric oscillator, nonlinear images by two-photon excitation and second-harmonic generation can be acquired. Further contrast modalities, such as higher harmonics or four-wave mixing are investigated.
Several tissue layers and cellular structures can be visualized in living tissue (mouse model) and ex vivo tissue (pig eyes). Cellular structures as epithelium, endothelium and keratocytes, as well as the lens capsule and cells were imaged, by using second-harmonic generation and four-wave mixing, collagen was imaged within the cornea and the transition from cornea to sclera could be studied.
Furthermore, diffusion of molecules through the cornea at different concentrations could be monitored as well, for applications such as corneal crosslinking.
Nonlinear laser microscopy is a well-suited method for non-invasive, staining free imaging of the anterior segment of the eye.

• 1576

OCT and IVCM in Corneal Imaging

DUA H S

Queens Medical Centre- Derby Road, Eye Ear Nose Throat Centre, Nottingham, United Kingdom

Optical coherence tomography (OCT) and In vivo confocal microscopy (IVCM) are two very useful imaging modalities in examination of the cornea. OCT provides non-contact, cross sectional images with a wide angle of view, under high magnification, simulating histology but in fact are dependent on the reflectivity of tissues. Imaging through scars is poor. Clinically is it very useful in examining interfaces created by refractive surgery and lamellar corneal surgery.

IVCM provides en-face images with a restricted field of view but with a resolution range of 1.5 to 4 microns allowing examination at a cellular level. The different layers of the epithelium, sub-basal plexus, Bowman's zone, stroma with keratocytes and nerves, the Descemet's membrane and endothelial cells can be clearly visualised in health and disease. Besides providing detailed morphology of the above structures it also enable visualisation of invading organisms such as acanthamoeba and fungi.

Software associated with both OCT and IVCM allow measurement of dimensions of objects/area(s) of interest. OCT is more accurate in measurement of depth while IVCM enables quantification of cell size, shape and numbers. Interpretation skills require experience for both.

EVER 2016
Thursday, Oct 6

• 2111

Vitrectomy in treatment naive diabetic macular edema

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(2) Lodz, Poland,
(3) Ophthalmology, Lodz, Poland
(4) Ophthalmolocy, Lodz, Poland

Purpose: To evaluate the potential benefit of vitrectomy in treatment naïve diabetic macular edema (DME).
Methods: A retrospective, clinical study of 44 consecutive patients with treatment-naïve DME. SD-OCT was performed before and after vitrectomy with inner limiting membrane peeling. Main outcome measures were final visual acuity, final central retinal thickness, need for repeated therapy.
Results: The follow up period ranged from 8 to 48 months. Overall, 31% of patients gained more than two lines and 84% of patients gained at least one Snellen line, and decreased by one Snellen line in one eye. Average central retinal thickness decreased from 595 µm to 266 µm at the end of follow up ($p<0.001$). Final visual acuity was inversely associated with duration of diabetes ($p=0.01$) and presence of epiretinal membrane ($p=0.02$) and initial visual acuity (0.03). Reappearance of macular edema was noted in three cases (6%), one of which received anti-VEGF treatment.
Conclusion: Vitrectomy may result in long lasting, satisfactory anatomical and functional results in treatment-naïve DME and may be more convenient than multiple intravitreal injections, especially for patients with transportation difficulties.

• 2112

Novel diagnostic tools in DRP - from science to clinical relevance

BRUNNER S
The Rudolph Foundation Hospital, Ophthalmology, Vienna, Austria

Due to a diabetes pandemia with more than 360 million people affected by 2030 worldwide, Diabetic Retinopathy (DRP) will remain the leading cause of vision loss although the percentage incidences of DRP have been substantially reduced. By careful management more than 90% of cases with blindness can be prevented. This presentation will demonstrate new findings from medical science with a potential to ease or improve diagnostics of DRP in the future. In particular, these methods can be used by non-ophthalmologists to estimate or suggest the individual risk for DRP, as well as by ophthalmologists to refine diagnosis and learn more about the systemic situation of their patients. Some of the most promising methods in the past years were (1) blood-circulating factors, as Angiogenin, other cytokines and different Endothelial Progenitor Cells (EPCs) in correlation to DRP and furthermore (2) the use of the 1060-µm Optical Coherence Tomography (OCT) to map choroidal thickness in patients with DRP. Results of clinical trials as well as considerations for a possible practial implementation of these new methods will be presented.

• 2113

OCT Angio imaging of the pathologic changes in PDR

GLITTENBERG C
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The presentation will give the audience an overview over swept source OCT angiography and it´s applications in imaging proliferative and non-proliferative diabetic retinopathy. The presentation will give a basic understanding of how motion contrast is used to visualize erythrocyte movement inside vessels as well as how using exactly this method leads to reflection and shadowing artifacts that can be misleading during diagnosis. We will show how new methods of temporal despeckling and flicker noise reduction can increase the visibility of subtle vessel changes that are pivotal in diagnosing and monitoring diabetic retinopathy. Additionally we will show how three-dimensional ray-traced rendering of the OCT-angiographic data sets increase the structural understanding of diabetic neovascularizations, micro-aneurysms, and retinal ischemias. The presentation will also include a discussion on the benefits of using swept source technology as well as a 1050nm wavelength in order to perform superior OCT angiographic examinations.

Conflict of interest
Any consultancy arrangements or agreements:
Topcon, Zeiss, Novartis, Thea, Bayer, Alcon, Lutronic

• 2114

Treatment of hard exudates in CSME in PDR using Micropulse mode

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Hard exudates are common in Diabetic Maculopathy. Quite often, it overlies the central part of the fovea causing severe visual loss. Some of the exudates may resorb while anti-VEGF treating is performed or while normalizing diabetic control. Some of exudates remain in the fovea preventing visual function increase. Focal conventional laser coagulation as a DME treatment can speed up the proses of lipid resorption but it is associated with potential iatrogenic visual loss, especially in fovea region. Micropulse mode suggested to be safe and macular-friendly treatment. This mode of laser energy delivery, if accurately titrated, do not left any signs of laser burns seen no on FA no on OCT. Micropulse 577 nm laser influence on lipids and surrounding RPE can stimulate hard exudates resorption and macular clearance. This potentially can be useful in case of visual loss due to hard exudates persisting in macular and especially foveal region.

• 2115

29G chandelier-assisted scleral buckling with new instruments

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(2) Rudolf Fundation Hospital, Ophthalmology Department, Vienna, Austria

Purpose: to modify a scleral buckling technique for retinal detachment (RD) treatment using 29-gauge twin-light chandelier, non-contact viewing system and a new illuminated indenter-marker.

Methods: Eight consecutive patients (8 eyes) were enrolled to this prospective observational study. During every surgery a new illuminated indenter-marker was used. Standard ophthalmologic examinations were performed before and after the surgery. The evaluation of the surgery duration was performed in every case.

Results: The mean initial best corrected visual acuity (BCVA) was 20/200, and after the surgery - 20/80. The retina reattached in all cases. The mean time of the surgical procedure was 35.12 minutes ± 9.05 minutes. In all cases minimal segmental buckle were used. In two cases an additional suturing of the sclerotomy after endolight withdrawal was necessary.
Conclusion: Endoillumination-assisted scleral buckling is a novel approach for RD treatment, which can be performed using microscope and non-contact viewing system. The new illuminated indenter-marker facilitates easier, and more controlled localisation of the retinal breaks with simultaneous marking of the desired area.

• 2121

You Tube: Different tubes for different glaucomas. : XEN

ARCINIEGAS-PERASSO C A
Institut Comtal d'Oftalmologia, Glaucoma Unit, Barcelona, Spain

Based on current evidence and clinical experience, this part of the SIS aims to introduce the participant into XEN tube glaucoma surgery.
Indications and contraindications, as well as the recommended preparation (anesthesia, mitomycin C use, instruments) will be reviewed.
The surgical technique will be considered from a step-by-step approach. Important surgical and clinical tips to make it easier to start with this device will be presented as a troubleshooting guide.

Conflict of interest
Any consultancy arrangements or agreements:
Surgical trainer and medical consultant for Aquesys, Inc. in 2014-2015

• 2122

You Tube: Different tubes for different glaucomas. : Ex Press

MUNOZ M
Institut Català de Retina, Glaucoma Department, Barcelona, Spain

Objective: We will show the current evidence about the Express device in glaucoma surgery; technique, utility, indications, relative contraindications, absolute contraindications and possible complications of the procedure. We'll point out the scientific evidence available with a practical and critical approach. We'll explain the surgical procedure and some tips based on the clinical experience. Finally, we will present interim results from a prospective randomized trial from our research group, currently active.

Conflict of interest
Any research or educational support conditional or unconditional provided to you or your department in the past or present:
Research funds ALCON Global

• 2123

You Tube: Different tubes for different glaucomas. : Ahmed Valve

MILLA E
Barcelona, Spain

Abstract not provided

• 2124

You Tube: Different tubes for different glaucomas. : Non valved Tube&Plate implants

DUCH S
Institut Comptal d'Oftalmologia - ICO, Glaucoma, Barcelona, Spain

This course aims to introduce to the glaucoma surgeon in the valve and shunts procedures. The rationale and the understanding of the basic technique will be discussed, as well as the different tricks to individualize this surgery to any type of patient. Videos and open discussion will allow the audience to participate in the clinical cases presented during the course.

• 2131

Update on IC3D classification

NOWINSKA A
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The lecture presents clinical, histopathological and genetic information on corneal dystrophies based on 2008 and 2015 International Classification of Corneal Dystrophies (IC3D). Corneal dystrophies are presented chronographically based on new, modified, anatomic classification proposed by the authors of the IC3D Classification. Clinical data of each dystrophy consists of former alternative names and eponyms, onset, course of the disease, signs, symptoms, optical coherence tomography and confocal microcopy analysis results. Genes and mutations linked to each CD would be presented as well as the histopathological data. The lecture also contains the summary of what was changed in the 2015 IC3D compared to the 2008 IC3D Classification.

• 2132

Confocal microscopy findings in corneal dytrophies

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Corneal confocal microscopy in vivo is a diagnostic method that uses 670 nm laser beam to visualize the structures of the cornea with an accuracy of 1 micron and visualization of single cells with 63x magnification. Proper diagnosis of corneal diseases is often difficult. The use of confocal microscopy for the in vivo analysis of the microarchitecture of the cornea can provide rapid and highly specific differentiation of corneal pathologies. The aim of the course is to acquaint participants with the method - corneal confocal microscopy in vivo and to present its utility in diagnosis and management of corneal dystrophies. Course consists of description of epithelial-basal membrane dystrophies, Bowman membrane dystrophies, stromal and endothelial dystrophies with respect to their typical histological features, differential diagnosis, evaluation and qualification for surgery and follow-up with detection of possible recurrences and post-surgical complications.

• 2133

OCT in treatment planning

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District Railway Hospital in Katowice, Ophthalmology, Katowice, Poland

Abstract not provided

• 2134

Photorefractive keratectomy for corneal dystrophies

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PTK is considered as one of many options in treatment of corneal dystrophies. Removal of pathologic tissue from the corneal surface or anterior stroma is sufficient to improve visual acuity. It can delay more invasive treatment for many years. In other cases PTK induces healing process of the cornea including restoration of epithelial basement membrane and renewal of the healthy multilayer epithelium. In cases which underwent keratoplasty for dystrophy, PTK may be offered as an early treatment in recurrence of the dystrophy in the donor tissue.

• 2135

Surgical treatment of corneal dytrophies

WYLEGALA E
Medical University of Silesia, Ophthalmology Clinic, Railway Hospital

Abstract not provided

• 2136

Corneal imaging after treatment in dystrophic eyes (OCT, CM)

DOBROWOLSKI D
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In late follow-up after lamellar or penetrating keratoplasty dystrophic corneas can develop again changes in the stroma. Advanced analysis of corneal morphology and morphometry based on OCT devices can predict such pathology. More specific imaging for early deposits delivers confocal microscopy. Analysis of corneal collagen layers, stromal keratinocytes and extracellular matrix deposits shows natural recurrence of the disease in transplanted cornea.

• 2141

Stimuli-responsive systems for tuneable ocular drug delivery

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Retinal diseases are currently treated by frequent injections of a drug-containing solution into the eye, an unpleasant procedure that may lead to complications and low treatment adherence. This has been partially addressed by developing implants that once sutured into the sclera or injected into the vitreous can release drug over months to years. However, once these implants are in place, drug release rates cannot be altered based on individual patient needs. Our research within the Buchanan Ocular Therapeutics Unit aims to develop stimuli-responsive implants that are able to slowly release drug over time, while also allowing for tuneable top-up dosing based on the disease progression. One such implant is based on porous conducting polymers using an anionic drug as the dopant. While baseline drug release is achieved by diffusion, further drug bursts can be activated by application of a small electrical signal. Two other systems are based on photo-sensitive polymers that can be cured or activated once injected into the vitreous by shining light through the cornea. This presentation will cover the preparation and evaluation of these stimuli-responsive systems including in vitro release data.

• 2142

Multiloaded Microparticulate Drug Delivery Systems for the Treatment of Retinal Diseases

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Retinal degenerative pathologies are becoming more prevalent due to the increase in society longevity. As most of retinal diseases are multifactorial, successful therapy requires a combination of drugs. Furthermore, effective concentrations of active substances must be maintained in the retinal target site for long periods of time. Due to the poor accessibility of retinal tissues, intraocular injections of therapeutic molecules are needed with the risk of adverse events. ***Biodegradable multi-loaded microspheres*** (MSs) offer an excellent alternative to multiple administrations as they are able to incorporate and deliver several therapeutic molecules in a controlled fashion for extended periods of time. Contrary to larger devices, administration of MSs is performed without the need of surgical procedures. Moreover, they disappear from the site of administration after delivering the drug. Personalized therapy can be easily achieved by selecting the amount of microspheres depending on patient's needs.
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• 2143

Intravitreal mobility of nanoparticles: how to make a move toward successful ocular gene delivery?

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Intravitreal injection is an interesting delivery route for the administration of nanoparticles for treatment of a variety of retinopathies. To reach the retina, nanoparticles need to diffuse through the vitreous and travel across the vitreoretinal interface. We have recently optimized an ***ex vivo*** assay that allows to measure the mobility of fluorescent nanoparticles in intact vitreous humour on a single-particle level. With this model, we optimize surface coating strategies of nanoparticles to assure good vitreal mobility, while maintaining the normal transfection efficiency. Also, we developed a novel ***ex vivo*** retinal model that is bovine-derived and, in contrast to existing models, keeps the vitreous and the vitreoretinal interface intact. This model is used to identify the potential of nanoparticles to reach retinal cell types after intravitreal injection. As Müller cells are the only cell type connecting the vitreal and retinal side of this interface, we specially focus on the role of Müller cells as our gateway to shuttle intravitreally injected particles across the vitreoretinal interface. As nanoparticles, we focus on polymer- or lipid based nanoparticles carrying messenger RNA or plasmid DNA as therapeutic molecules.

• 2144

Ocular drug delivery and pharmacokinetics: Influence of drug properties and delivery systems

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Although the eye is readily accessible for drug dosing, drug delivery to the eye remains a major challenge due to multiple static and dynamic barriers. After topical administration, much less than 10 percent of the drug in the dosage form reaches intraocular tissues, primarily those in the anterior segment. No topical dosage form is currently approved for back of the eye drug therapy due to inadequate drug delivery. Topical dosing is currently viable only for small molecule drugs since macromolecules are not delivered adequately by this route of administration to be therapeutically effective. Intravitreal dosing through injections and surgical means, while allowing 100 percent dose delivery to the back of the eye, poses multiple challenges including rapid clearance of small molecules in solution, necessitating the use of slow release delivery systems. Macromolecules are cleared more slowly from the vitreous humor of the eye, allowing drug dosing once every month or two. Currently efforts are underway to reduce dosing frequencies for macromolecules as well. The purpose of this presentation is to describe mechanisms of topical and intravitreal drug delivery, with a key focus on drug and delivery system properties. Also, emerging routes of administration including suprachoroidal and transscleral routes will be discussed.

• 2145

Ocular pharmacokinetics assessed by in-vivo microdialysis

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A key challenge in drug development is to obtain reliable concentration-time profiles in potential target tissues. For the eye, data regarding drug concentration in the anterior chamber and the vitreous is crucial for optimizing the dosing for topically applied therapies. Given that in most cases, invasive serial probe sampling in humans is not possible for ethical reasons, data regarding drug penetration in the eye routinely relies on in-vivo animal models. Classical pharmacokinetic models are based on obtaining single samples of the anterior chamber and the vitreous at consecutive timepoints in different animals. In contrast to that, in-vivo microdialysis offers a new possibility to determine statistically robust pharmacokinetic profiles without including large numbers of animals. As described previously described for other tissues, microdialysis allows for the continuous in-vivo sampling of analytes in a tissue by implantation of a probe with a semi-permeable membrane in the target tissue. The current talk aims to give an overview about the microdialysis technique with special regards to the ocular tissues. In addition, advantages and potential disadvantages as well as the limitations of the technique will be discussed.

• 2151

Retinal structural changes before and after idiopahic epiretinal membrane peeling - a study using OCT segmentation

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Purpose We aim to study the microstructural changes and thickness of inner retinal layers in patients with idiopathic epirretinal membranes treated with peeling
Methods Observational retrospective study that included patients treated for idiopathic epiretinal membrane. Visual acuity and central retinal layers thickness were recorded before and at the last follow up visit. The retinal layers thickness was given by automated segmentation of OCT Heidelberg Spectralis but the accuracy was verified and when in disagreement, manual correction of the segmentation was made and the new measured thickness was used. 33 patients were treated with combined fhacoemulsification.and peeling and 14 patients had only peeling of the epiretinal membrane with vitrectomy.
Results 47 eyes of 46 patients were included with a mean age of 73.44 years.There was a significant improvement of visual acuity from 0.3±0.1 to 0.6±0.2 (p<0.0001). From the tomographic analysis,was noted a significant reduction in the mean central macular thickness (CMT) from 469.4±97.74 to 397.8 ± 71.16 (p<0.0001),in the retinal nerve fiber layer (RNFL) thickness from 51.2±49.84 to 24.71±23.21 (p<0.0001), in the ganglion cell layer (GCL) thickness from 55.4±25.22 to 39.2±13.08 (p<0.0001),in the internal plexiform layer (IPL) thickness from 46.31±13.46 to 38.62±13.62 (p=0.0012), in the outer plexiform layer (OPL) thickness from 39.71±9.04 to 34.38±7.9 (p=0.0016) and in the internal retinal layers (IRL) thickness from 384.5±97.7 to 312.8±70.8 (p<0.0001). There was no statistical difference in the thickness of the outer retinal layer,outer nuclear layer and inner nuclear layer before and after membrane peeling
Conclusions The layers that most have changed and contributed to the reduction of central thickness treated with peeling were the Internal Retinal Layers:RNFL,GCL and IPL

• 2152

Morphological, phisiological and immunocytochemical evaluation in patients with idiopathic epiretinal membranes

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Purpose To investigate changes of the vitreoretinal interface in patients with idiopathic epiretinal membranes (ERM).
Methods Analysis of 23 patients treated by 25G PPV due to visual imparment caused by idiopathic ERM. BCVA and DRI OCT (Atlantis Topcon) imaging was performed before surgery and in one year follow up. Retinal and vitreoretinal interface morphology was evaluated and compared with changes in visual fuction. ERM and internal limiting membranes (ILM) were collected intraoperatively for immunocytochemical analysis. Photographeis of probes were made by scanning confocal microscope LSM 88- Zeiss, with seven laser lines, 32-channel spectral detector GaAsP and two photomultiplier for fluorescence and one for transmission. Scanning module was connected with reverse optic microscope Axio Observer Z1 Zeiss with fluorecsent lamp and adequate filters.
Results BCVA before surgery was from counting finger from 3 meters to 0,5 (mean 0,1) and in one year of postoperative follow up ipmroved to 0,3-0,9 (mean 0,6). In 18 eyes (78%) vitreoretinal traction was visualized by OCT DRI before the surgery. Mean central retinal thickness (CRT) was 487 µm. In patients with CRT more than 500 µm macular oedema in preoprative scans was observed. In these cases the oedema was reduced in one year of postoperative observation. Microscopic and immunocytochemical analysis revealed a high amount of cells in ERM probes and low number of cells in ILM probes (immunoreactivity was positive for glial cells, retinal pigment epithelium, hyalocytes, actin and macrophages).
Conclusions New techniques of visualisation and analysis improve possibilities of diagnostic and evaluation of treatment results in patients with ERM. These methods should be used as complementary. Evaluation of wider group of patients may improve the knowledge in the field of idiopathic ERM etiopathogenesis.

• 2153

Mechanism of "Flap Closure" After the Inverted Internal Limiting Membrane Flap Technique

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Purpose 4 macular hole closure types are known: U-type, V- type, irregular and flat open. After the inverted ILM flap technique some macular holes are covered only with a thin layer of the inverted ILM flap shortly after surgery (flap closure). The aim of this paper is to describe functional and anatomical results in eyes closed with "flap closure".
Methods Data of 190 eyes after vitrectomy with the inverted ILM flap technique were reviewed in order to spot eyes, in which the hole was open and covered only with a thin layer of the inverted ILM flap one week postoperatively. Swept Source OCT performed preoperatively and at 1 week, 1, 3, 6, and 12 months after surgery was anlyzed.
Results Flap closure was noted in 50/190 eyes (26,3%) one week after surgery. Preoperatively, the minimum hole diameter was 544,04 um and maximum diameter at the base was 1001,42 um, in those eyes. Visual acuity improved from 0,91 logMAR to 0,54 logMAR 12 months after surgery. Final closure type of most eyes primarily closed with the inverted ILM flap technique was U- type closure. Photoreceptor defects improved during the observation period (50 eyes- 1 week, 41 eyes- 1 month, 34 eyes- three months, 23 eyes- six months, 19 eyes- 12 months). Restoration of the external limiting membrane preceeded restoration of the photoreceptors. Retinal nerve fiber layer defects were noted in 16 eyes 1 month postoperatively. No new retinal nerve fiber layer defects were noted during the rest of follow- up.
Conclusions Macular holes closed only with a thin layer of the inverted ILM flap preopeartively, improve their architecture up to 12 months after surgery. Visual acuity improvement was noted in those cases."Flap closure" is a new closure type, which probably enables closure of large macular holes, which would remain open without the use of the inverted ILM flap technique.

• 2154

Accuracy of retinal layers optical coherence tomography automated segmentation before and after epiretinal peeling

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Purpose To access the accuracy of Spectral Domain - Optical Coherence Tomography (SD-OCT) retinal layers automated segmentation before and after idiopathic epiretinal membrane (ERM) peeling.
Methods Retrospective observational study that included 37 eyes of 37 patients with ERM. OCT scans before and after peeling were obtained with Spectralis Heidelberg Engineering©. Two independent observers determined the accuracy of the automated retinal layer segmentation in the 3mm central area. Manual correction of the automated segmentation was made as needed by the two observers and the new measured individual layers central thickness (CT) was compared to the one given by automated segmentation.
Results Agreement between observers was perfect for the exams that needed manual segmentation correction. The agreement was moderate (kappa=0.51) for outer plexiform layer (OPL) before surgery and good to perfect (kappa>0.62) for the other layers before and after surgery. Preoperatively, 81.8% of the exams needed manual correction. The obtained CT was different (p<0.05) before and after manual correction for central macular thickness, retinal nerve fibre layer (RNFL), ganglion cell layer, inner nuclear layer (INL), OPL and outer nuclear layer; no difference was noted in the inner plexiform layer and outer retinal layers (between external limiting and Bruch membranes). Postoperatively, 29.7% of the exams needed manual correction. There was a significant difference in the CT obtained with automated segmentation versus manual correction only in RNFL and INL.
Conclusions OCT automated segmentation is not accurate in the internal retinal layers of patients with ERM before surgery, probably due to the much altered structure of these layers. After the surgery its accuracy is better. We recommend the verification of the automated segmentation in patients with ERM before surgery.

• 2155

Unexplained vision loss with intra-ocular silicone oil tamponade in situ; a case series

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Purpose Silicone oil provides a long-lasting retinal tamponade which is of particular benefit when attempting to repair complex retinal detachments associated with proliferative retinopathy and giant retinal tears. There have been reports of sudden unexplained visual loss secondary to the use of silicone oil tamponade, often after removal of silicone oil, which is typically severe and permanent. We report a case series of patients who lost vision with silicone oil tamponade in situ.
Methods Observational report and analysis of three cases of unexplained vision loss with silicone oil tamponade in situ for retinal detachment surgery.
Results Three cases of unexplained vision loss with silicon oil tamponade were analysed. Two were male and the average age was 55 (51-62 years). 2 cases were macular on retinal detachments. 3 months post operatively, visual acuity was 6/9 in two cases and 6/12 in the third case with silicone oil in situ. Silicone oil 2000cs was used in all cases and the primary success rate was 100%.
All had normal intra ocular pressure, fundal examination and optical coherence tomography at 3 months. Loss of vision occurred at 5 months post-surgery with silicone oil in situ in all three cases. Visual acuities dropped to 6/60, 6/36 and 6/36 respectively. Silicone oil was removed in all cases and visual acuities were 6/36, 6/60 and 2/60 at 1 year following silicon oil removal. Electro-diagnostic tests confirmed reduced macular function in the affected eyes.
Conclusions Unexplained vision loss secondary to silicone oil tamponade is severe and permanent.
The etiology is still unknown and further work is required to identify the incidence and potential risk factors for this devastating phenomena. A better understanding of this condition would enable us to manage these cases more appropriately and reduce the likelihood of it occurring.

• 2161

The initial consultation

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Purpose Patients with complaints of seeing badly in the dark need a full ophthalmological workup.
Methods Acquired versus congenital nightblindness has to be questioned in a full anamnesis. Visual acuity, biomicroscopy and fundus examination are essential followed by visual field testing and possibly visual electrophysiology (flash ERG)
Results Several causes of congenital and acquired nightblindness can be found. Not all patients complaining of seeing badly in the dark are "nightblind"
*Conclu*sion
A full clinical ophthalmological work up can identify adequately sev*eral causes of night blindness*

• 2162

Causes of night blindness

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Purpose *To describe the causes of both genetically determined and acquired night blindness.*
Methods A case presentation format will be used to illustrate different genetically determined and acquired conditions leading to night blindness. Both clinical and electrophysiological phenotypes as well as genotypes will be discussed.
Results Phenotypes and genotypes of genetically determined diseases leading to night blindness are very different. An important distinction to be made is the one between stationary and progressive diseases. Indeed, other than night blindness the visual outcome differs considerably between different conditions.
Conclusions The causes of night blindness are diverse. Taking a thorough history in combination with an extensive clinical examination and psychophysical and electrophysiological tests most often allows a to make a specific diagnosis. Acquired conditions are generally treatable, and should be differentiated from those that are inherited. For genetic disease, it is important to distinguish between progressive and stationary conditions.

• 2163

The electrophysiology of patients with nyctalopia

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The lecture will use a case-based approach to demonstrate the value of electrophysiological testing in the diagnosis and management of patients with nyctalopia. The diagnostic features of various inherited and acquired diseases will be described, including photoreceptor dystrophies, congenital stationary night blindness, fundus albipunctatus, melanoma associated retinopathy, vitamin A deficiency and others.

• 2164

What limits normal visual performance in the dark?

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When patients describe difficulties in seeing in the dark we need to consider whether this refers to rod photoreceptor dysfunction and how this affects our vision. How can we reliably measure scotopic (rod mediated night) vision and what functional consequences would we expect from losses of scotopic vision? Are visual losses attributable to cell death of rod photoreceptors or to dysfunction of the Retinal Pigment Epithelium (RPE)? Since there are no rods in the central fovea we must consider the spatial distribution of rods, the contribution of the RPE and other factors on difficulties in seeing in the dark.

• 2171

Age-related changes of cystatin C and effects on protein turnover in RPE cells

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Essential functions of the retinal pigment epithelium (RPE) rely on specific proteolysis processes that require efficient regulation both intra- and extracellularly. One of the most potent regulators of proteolysis, the cysteine proteinase inhibitor cystatin C, is among the top 2% abundantly expressed genes by RPE. The secretion profile of cystatin C in RPE cells suggests a role in relation to maintaining the structure and function of Bruch's membrane/choroid. Variant B cystatin C is associated with increased risk of developing exudative age-related macular degeneration (AMD) and presents leader sequence-related altered intracellular trafficking, leading to reduced efficiency of processing through the secretory pathway. The abundance of cystatin C is reduced with ageing in the macula region of the RPE/choroid and cystatin C expression and secretion are significantly decreased in response to the accumulation of advanced glycation end-products (AGEs). Together the data point out to a likely role for the wild type cystatin C in regulating the proteolytic homeostasis in the retina/choroid, which is declining with age and the decline is accelerated in homozygous carriers of AMD-associated variant B.

• 2172

Cytoprotective alpha crystallins in the regulation of RPE cell proteostasis

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AlphaB-Crystallin (αBC) is an ubiquitous protein with dual function as a molecular chaperone to preserve proteostasis and as an anti-apoptotic agent. We studied the regulatory role of αBC in murine models of oxygen-induced retinopathy (OIR), laser-induced choroidal neovascularization (CNV) and subretinal fibrosis (SF). αBC KO attenuated retinal NV in OIR as compared to WT. In the laser model, CNV lesion size was significantly reduced in αBC KO vs WT mice. VEGF increased 8 fold in WT vs αBC KO on day 3 and 7 post-laser and VEGF secretion was lower in αBC KO vs WT. Increased mono(tetra)-ubiquitination of VEGF was observed in αBC siRNA RPE. Further, αBC regulated SF in mice. Attenuation of SF after regression of laser-induced CNV of αBC KO and a decrease in mesenchymal RPE cells as compared to WT was found. αBC was prominently expressed in SF lesions. TGF-β induced EMT was further enhanced by αBC overexpression but was inhibited by suppression of αBC. Silencing of αBC inhibited RPE cell proliferation, migration, and fibronectin production. αBC overexpression enhanced nuclear translocation and accumulation of SMAD4 and SMAD5. Thus, αBC is an attractive therapeutic target for AMD with an advantage in controlling both CNV and SF.

• 2173

The marine n-3 PUFA DHA evokes cytoprotection by inducing autophagy and NFE2L2 in human retinal pigment epithelial cells

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Accumulation of misfolded proteins is the hallmark of neurodegenerative diseases. Age-related macular degeneration (AMD) is a leading cause of central blindness and improved primary prevention and treatment options are needed.
The initial phase of AMD associates with accumulation of intracellular lipofuscin and extracellular protein deposits (drusen). Epidemiological studies have suggested an inverse correlation between dietary intake of marine n-3 polyunsaturated fatty acids (PUFAs) and the risk of AMD. Autophagy is a major cellular mechanism for degradation of damaged intracellular components and has a cytoprotective role. In human retinal pigment epithelial cells we find that the n-3 PUFA docosahexaenoic acid (DHA) induces a transient increase in the oxidative stress response regulator NFE2L2/NRF2. Simultaneously, there is a increase in autophagy of intracellular protein aggregates containing SQSTM1/p62. DHA rescues the cells from arrest induced by misfolded proteins or oxidatives stress in a autophagy and NFR2 dependent manner. These results suggest that DHA both induces endogenous antioxidants and mobilizes selective autophagy to reduce the risk of developing aggregate-associate diseases like AMD.

• 2174

Nrf2- and PGC-1α-deficient mice: A novel animal model for disturbed proteostasis and RPE degeneration

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Impaired autophagic and proteasomal cleansing have been documented in aged retinal pigment epithelial (RPE) cells and age-related macular degeneration (AMD). Both of them participate in the regulation of proteostasis in the retina. Nrf2 and PGC-1 transcription factors mediate cellular defence against oxidative stress. We describe a novel Nrf2 and PGC-1 knock-out mouse model that induces RPE degeneration. Aged Nrf2/PGC1 knock-out mice developed RPE degeneration, associated with upregulation of lipid peroxidation marker 4-HNE, ubiquitin protein aggregates, selective autophagy markers Beclin-1, SQSTM1/p62 and LC3. These changes were accompanied by impaired visual function as assessed by ERG. Our findings suggest that combined Nrf2 and PGC-1 deficiency increases oxidative stress and protein aggregation, and affects autophagy in RPE. Nrf2 and PGC-1 knock-out mouse model provides a novel tool to study role of proteostasis in the degeneration of RPE and autophagy as therapy target in the prevention of age-related cellular damages.

• 2181

Optical properties of the lens: An explanation for the zones of discontinuity

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Zones of discontinuity seen in living healthy human lenses when they are viewed using biomicroscopy are not understood from structural or functional perspectives. They scatter light but do not impede or impair vision and there are no known structures that could explain their presence. Previous methods that measured changes in the optical property of refractive index and changes across the tissue in refractive index that create the gradient index structure did not detect any variations that could be related to the zones of discontinuity. Recent work undertaken at the SPring-8 synchrotron using an X-ray Talbot interferometer has enabled the most detailed measurements of refractive index to date to be undertaken. The results show subtle fluctuations in the refractive index suggesting step changes in the gradient. When these step changes or contours were inserted into lens models and subjected to a computational analysis that simulated the effects of biomicroscopic viewing, the zones of discontinuity were recreated. This is the first known evidence linking the refractive index to these features. It provides an explanation for their structure. The functional implications and potential for future implant design need to be explored.

• 2182

Cortical cataracts: The case for mechanical stress

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In previous publications, we found that human cortical and cuneiform opacities are accompanied by changes in fiber structure and architecture mainly in the equatorial border zone between the lens nucleus and cortex. Because the lens cortex and nucleus have different viscoelastic properties in young and old lenses, we hypothesized that external forces during accommodation cause shear stress predominantly at this nucleus-cortex interface. The location of the described changes suggested that these mechanical forces may cause fiber disorganization, small cortical opacities, and ultimately, cuneiform cataracts.

Recently, we tested our hypothesis in a stretching device for anterior eye segments from human donor eyes. Lenses with cortical cataracts showed ruptures at the nucleus-cortex interface adjacent to the cortical cataracts. These ex vivo experiments indicate that the nucleus-cortex interface is vulnerable and it can be separated when external forces are applied. In vivo forces from the attempt to accommodate are smaller, but a continuous action during years may induce micro ruptures at this interface which may lead to cortical cataract.

• 2183

Optical imaging properties of multifocal IOL

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An increasing demand of spectacle independence after cataract surgery or clear lens extraction has greatly stimulated the development of multifocal intraocular lenses (MIOLs). Optical design has played an essential role in this progress. Based on the principle of simultaneous vision, MIOLs overcome the loss of accommodation by providing at least two primary powers intended for distance and near vision. Diffraction-based MIOLs have proved better optical performance than multizonal refractive MIOLs and accommodative IOLs. Some new designs of diffractive MIOLs attempt to direct light either to an intermediate focus location or to an extended focal segment for an improved visual acuity at intermediate distances. Although the patient primarily perceives the focused image, they can also experience disturbing visual phenomena, such as halos and glare. The optical imaging performance of MIOLs, as referred to some quality metrics, is assessed using ***in-vitro*** as well as ***in-vivo*** testing methods. This work reviews the objective imaging quality of a variety of MIOLs measured in an optical bench and compares the experimental results with those obtained in the clinical practice.

• 2184

Light-Adjustable Lens: A non-invasive approach to adjust remaining refractive errors after cataract surgery

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Yet, in spite of improvements in preoperative lens power calculation, many patients are in need of spectacle correction to achieve emmetropia and/or an optimal distance vision after cataract surgery.
One possibility to reduce this is to have the ability to adjust residual spherical and astigmatic errors postoperatively in a predictable and non-invasive way.
Calhoun Vision's LAL is based upon the inclusion of a proprietary photoreactive silicone macromer within a silicone polymer matrix. Selective irradiation of the implanted LAL by targeted dosages of UV light (365 nm) produces modifications in the lens curvature resulting in a predictable spherical and/or cylindrical power change postoperatively. After achieving the desired refractive outcome, the LAL is irradiated to polymerize remaining photosensitive macromers and prevent additional change in lens power.
The purpose of this presentation will explain the LAL technology, as well as treatment options and expected future applications.

• 2185

Accommodative IOLs: An update on recent developments

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Purpose: To compare the clinical results of the Lumina accommodative intraocular lens (IOL) with a standard monofocal IOL.
Methods: Clinical study including 86 eyes that underwent cataract surgery. The study group included 61 eyes implanted with the Lumina. The control group included 25 eyes implanted with an Acrysof monofocal IOL. Visual function, contrast sensitivity (CS) and accommodation with an open-field autorefractor were measured during one year.
Results: Uncorrected near visual acuity (UNVA) was 0.07±0.08 LogRAD for the Lumina group and 0.37±0.19 in control group ($p<0.01$); corrected distance near visual acuity (CDNVA) was 0.11±0.12 for the Lumina group and 0.41±0.15 for the control group ($p<0.01$). Defocus curves showed significant better results for the Lumina group for defocus ranging from -4.50 to -0.50D ($p<0.01$). Accommodation was 0.63±0.41, 0.91±0.51 and 1.27±0.76D for the Lumina group and 0.10±0.15, 0.06± and 0.07±0.10D for the control group at accommodation stimuli of 2.0, 3.0 and 4.0D, respectively. CS was the same for both groups ($p\geq0.26$).
Conclusions: The Lumina accommodative IOL effectively restores the visual function and accommodation after cataract surgery with no influence on the postoperative CS.

• 2311

From time domain to high resolution and angio-OCT: an historical perspective

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Optical coherence tomography (OCT) is a non-invasive tool that allows in vivo imaging of almost all the structures of the eye. It was introduced into the clinical practice more than twenty years ago. The advances in OCT technology are mainly based on ultra high-resolution, adaptive optics, eye-tracking, and changes in signal detection. Regarding this last aspect, the technology has evolved from time-domain (TD) to spectral-domain (SD) detection, providing a higher definition of the analyzed structures. Today, SD OCT has become a part of the routine practice. Apart from its diagnostic value, OCT has allowed an objective assessment of treatment response. In addition, it has provided predictive value for visual recovery and prognosis of several diseases. Recently, SD-OCT has given to the ophthalmic researchers a renewed enthusiasm: a special processing algorithm has been developed for high-speed OCT devices. This OCT technique, known as OCT angiography, can produce images of capillary-level blood flow in the retina and choroid. OCT technology continues to develop further and this will provide new insights for the pathogenesis of several eye diseases.

• 2312

Anterior segment OCT in corneal diseases and surgery

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Purpose: Optical coherence tomography (OCT) after extended use in diagnosis of retinal diseases has now become a new cross-sectional imaging approach useful for anterior segment (AS) imaging. The potential advantages and limits using AS-OCT in corneal diseases and surgery are presented
Methods: Systematic literature review search and clinical examples focused in the fields of corneal ulcerations, opacities and corneal graft penetrating and lamellar surgery.
Results: AS-OCT provides accurate morphology and measurements of different structures of the AS and of the cornea. Corneal loss of transparency in general permits visualization of the deeper AS structures facilitating surgical choice in complex cases. In contrast ciliary bodies are barely visualized, in contrast to UBM, due to light absorption by pigmented iris layers. Morphometry of corneal structures is particularly useful in the preoperative evaluation of thinning disorders, corneal ulcerations, infections and loss of transparency and after penetrating and lamellar surgery, including assessment of LASIK flaps and of deep anterior keratoplasty interfaces and endothelial keratoplasty lenticules adhesion. New generation optical coherence tomography angiography (OCTA) system for the assessment of corneal neovascularisation may be useful to evaluate ocular surface and corneal diseases in which the growth of vessels plays a role in the history and management of pathology.
Conclusions: AS-OCT presents advantages in the clinical practice in the field of corneal disease and surgery. This technology alone should not substitute a comprehensive clinical examination but may offer valuable insights in the quantification and observation of fine details which can be obscured or not detectable during conventional slit-lamp examination.

• 2313

OCT as a Novel useful tool in corneal transplantation

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Fast and high-resolution cross sectional imaging of the cornea by OCT proves essential in corneal graft: 1/during Eye Banking: non-contact safe and accurate thickness measurements are available to guide pre-cutting of DSAEK and control cut regularity; 2/diagnosis and follow-up of corneal diseases undoubtedly benefit from OCT that can help establishing indication for graft; 3/after endothelial keratoplasty (EK), OCT shows graft position and adherence to the recipient bed and endothelial function through corneal thickness; 4/after all grafts, OCT provides topography, thickness (useful during rejection and late endothelial failure), and images of donor/host interface and irido-corneal angle; 5/The place of Iintra operative OCT expands rapidly, allowing an easy control of EK orientation, improving the safety of DALK or femtosecond laser-assisted keratoplasty, and allowing the development of new techniques like intrastromal lamellar graft. Exciting perspectives will be illustrated with 2 examples: 1/an Optical Coherence Microscope that combines the large field of OCT and the cellular resolution of confocal microscopy; 2/the monitoring of thickness during storage in a innovative bioreactor that restores the intra ocular pressure.

• 2314

Usefulness of OCT for imaging the choroid, the vitreous and the optic nerve during uveitis

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Imaging – and its quantitative analysis - provides the opportunity for us to transform how we assess intraocular inflammation. The use of optical coherence tomography (OCT), particularly as it increases in depth of sampling and width of field, supported by novel approaches to the analysis of these images have the potential to supersede many of our subjective clinical assessments. In this presentation, we consider how OCT of the whole posterior segment – not just the retina - has the potential to facilitate both diagnosis and quantitative objective assessment of intraocular inflammation. Finally we consider how this is likely to impact both routine clinical practice and the design of clinical trials.

• 2321
Tridimensional studies on the adult rat optic nerve head

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Purpose: To reconstruct rat optic nerve heads (ONHs) with unilateral experimental glaucoma (EG), so as to 3D characterize the normal and early EG ONH anatomy in the rat.
Methods: Hypertonic saline was unilaterally injected into the episcleral veins of 8 Brown rats that were sacrificed 4 weeks later. Orbital optic nerve (ON) sections were graded. ONH's were 3D reconstructed, delineated, and parameterized. Overall and individual EG vs control eye differences were studied by linear mixed effect models adjusted for multiple comparisons.
Results: The rat ONH has 2 scleral openings (superior neurovascular and inferior arterial) separated by a sling. In the superior one, the nerve abuts a prominent extension of Bruch's Membrane (BM) superiorly and is surrounded by a plexus. ON and anterior scleral canal opening (ASCO) expansions were significant overall and in 7 EG eyes. In at least 5 EG eyes, significant expansions in BM Opening (BMO) (3-10%), ASCO and Posterior Scleral Canal Openings (PSCO) (8-21% and 8-41%, respectively) were found. ON expansion was correlated to ON damage.
Conclusions: The 3D complexity of the rat ONH has been undervalued in previous 2D studies. ON, BMO and neurovascular canal expand early in response to IOP elevation.

• 2322
Counting microglial cells in the adult rodent retina

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Glaucoma is a chronic optic neuropathy linked to the damage and death of retinal ganglion cells. Microglial cells seem to play a critical role on glaucomatous physiopathology, and their proliferation has been considered a hallmark of neurodegenerative diseases ongoing, also in the retina.Quantitative microglial studies require big sets of images analysed. Because manual cell counting methods are tedious and time consuming, computational approaches have been developed for counting cells in the nervous system. Nonetheless, microglial complex morphology makes difficult proper cell identification with standard methods. We present a new and interactive algorithm implemented in MATLAB for quantitative analysis of Iba-1+ microglial cells in adult mice retinas.Without any computation knowledge, this technique enabled a fast quantification of microglial cells with reliability similar to manual method, in both non-proliferative and in a proliferative state in a mouse model of unilateral laser-inducer ocular hypertension. Although this algorithm has been developed for retinal microglial analysis in a specific model, some parameters can be modified in the interactive interface for its application in other retinal pathologies or either tissues

• 2323
Algorithms looking for patterns of cell loss in glaucoma models

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Whole-retinal mounts have proven an invaluable tool for the assessment of retinal health in rodent models of disease with well-established protocols for labelling of a variety of retinal cell populations including Retinal Ganglion Cells (RGCs). Loss of RGCs is thought to play a central role in many ocular disorders such as glaucoma, and RGC preservation is an established therapeutic endpoint. Nevertheless, a limitation of this approach is the high variability in RGC density between central and peripheral rodent retina, which can complicate RGC quantification by sampling. Whilst automated whole-retinal measures of RGC density have added scientific rigour to the quantification of RGC populations, this technique still discards a lot of useful information. This talk outlines recent developments in the extraction of additional information from retinal whole-mounts and reviews future directions for this technique in developing our understanding of disease pathology.

• 2324
Counting retinal neurons in the adult rat retina

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We study in adult albino rats long-term effects on the ganglion cell and photoreceptor layers of the retina after ocular hypertension (OHT) or introarbital optic nerve transection (IONT). OHT was induced by lasering limbar tissues while IONT was performed at 0.5 mm from the optic disc (OD). The ganglion cell layer (GCL) was investigated in wholemounts to identify, count and map RGCs (identified with Fluorogold labelling, or Brn3a or melanopsin (m) antibodies), cells in the GCL (DAPI-staining to detect nuclei in this layer or calretintin antibodies to identify displaced amacrine cells). The distribution of S- and L-cones was studied in wholemounts immunoreacted for S- and L-opsin. Following OHT there were significant diminutions of orthotopic and displaced Brn3a+RGCs in pie-shaped sectors. These sectors had large numbers of DAPI+nuclei, calretinin+cells and m+RGCs. The S- and L-cone populations diminished to 65% and 80%, or to 20 and 35% at 1 or 6 months, respectively, indicating severe cone loss. IONT resulted at 15 days in massive loss of Brn3a+RGCs or m+RGCs throughout the retina and at 15 months the loss represented less than 1% or 35% of the original populations, respectively, indicating a greater survival for m+RGCs.

• 2331

Alterations of retinal vessel size after single injection of intravitreal anti-VEGF for diabetic macular edema

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Purpose To determine the affect of single injection of intravitreal anti-vascular endothelial growth factor on the retinal vessel caliber in eyes with diabetic macular edema.
Methods Overall 32 patients were enrolled in ranibizumab group, 30 patients were included in bevacizumab group. Each of these groups also was divided into two others consisting of study group and control group. The study groups were composed of injected eyes while the non-injected fellow eyes served as control group. The patients underwent complete ophthalmic examinations including optical coherence tomography and fundus fluorescein angiography. The primary outcome measures were central retinal artery equivalent (CRAE), central retinal vein equivalent (CRVE) and artery-to-vein ratio (AVR).
Results In ranibizumab study group (n=32), pre-injection mean CRAE (175.42 µm) decreased to 169.01 µm at one week and to 167.47 µm at one month (P<0.001) while baseline CRVE (235.29 µm) decreased initially to 219.90 µm at one week then to 218.36 µm at one month (P<0.001). In bevacizumab study group (n=30), pre-injection CRAE (150.21 µm) decreased to 146.25 µm at one week and to 145.89 µm at one month (P<0.001) while baseline CRVE (211.87 µm) decreased initially to 204.59 µm at one week then to 205.24 µm at one month (P<0.001). Pre-injection AVR values changed significantly (P=0.001) at one week and at one month in ranibizumab group, but no significant alteration of AVR was observed in bevacizumab group (P=0.433). In the control groups of both ranibizumab (n=32) and bevacizumab (n=30), none of the three parameters altered throughout the study period compared to the baseline (P>0.05).
Conclusions Both ranibizumab and bevacizumab injection significantly constricted retinal vessel diameters in eyes with diabetic macular edema.

• 2332

Upregulated expression of heparanase in the vitreous of patients with proliferative diabetic retinopathy originates from activated endothelial cells and leukocytes

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Purpose To determine and interrelate the levels of heparanase, syndecan-1 and vascular endothelial growth factor (VEGF) in proliferative diabetic retinopathy (PDR), and to study the production of heparanase by human retinal microvascular endothelial cells (HRMEC) and its effect on HRMEC barrier function.
Methods Vitreous samples from 33 PDR and 27 nondiabetic patients, epiretinal membranes from 16 patients with PDR and HRMEC were studied by enzyme-linked immunosorbent assay, immunohistochemistry, and Western blot analysis. The effect of heparanase on HRMEC barrier function was evaluated by transendothelial electrical resistance.
Results We showed a significant increase in the expression of heparanase, syndecan-1 and VEGF in vitreous samples from PDR patients compared to nondiabetic controls. (p<0.0001 for all comparisons). Significant positive correlations were found between the levels of heparanase and the levels of syndecan-1 (r = 0.75, p<0.0001) and VEGF (r = 0.91, p<0.0001) and between the levels of syndecan-1 and the levels of VEGF (r = 0.78, p<0.0001). In epiretinal membranes, heparanase was expressed in vascular endothelial cells and CD45-expressing leukocytes. High-glucose, TNF-α and the combination of TNF-a and IL-1b, but not cobalt chloride induced upregulation of heparanase in HRMEC. Heparanase reduced transendothelial electrical resistance of HRMEC.
Conclusions Our findings suggest a link between heparanase, syndecan-1 and VEGF in the progression of PDR and that heparanase is a potential target for therapy of diabetic retinopathy.

• 2333

In vivo measurement of increased vascular permeability after STZ induction of diabetes in rats by fluorescence angiography using the Micron IV

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Purpose Diabetic retinopathy (DR) is a major complication of diabetes and a leading cause of blindness. Chemically induced diabetic rodent models mimic some phenotypic changes in DR, but quantitative assessment of increased vascular permeability seen in diabetes usually requires invasive and terminal experiments. The Micron IV provides enhanced sensitivity, resolution, real-time capture and a non-invasive platform compared to comparable systems. This study tests the hypothesis that retinal vascular leakage can be assessed in vivo over time, using the Micron IV.
Methods FA was carried out in non and diabetic rats on day 0 and 7 using the Micron IV. Animals received a single dose of PBS (n=6) or streptozotocin i.p., 50mg/kg (n=6) on day 1 and blood glucose levels were measured on day 4. Angiograms were converted to 8-bit images in ImageJ and the intensity of sodium fluorescein in an area of the vascular interstitium and the retinal vessel were measured over time. The ratio of interstitial to vascular fluorescence intensities were plotted against time to give rate of increase in intensity per unit time.
Results Retinal vascular leak was measured in the same focal position of the retina on day 0 and 7 using the Micron IV. Retinal leak was shown to significantly increase (p <0.05) in the STZ induced diabetic group (13.3 ± 3.30 x10-4.s-1) compared to non-diabetic controls (7.5 ± 3.7 x10-4 .s-1), on day 7. This was supported by fundus images showing increased capillary leakage and the formation of multiple micro-aneurysms in the retina.
Conclusions The Micron IV system provides a standardised, real-time and non-invasive platform to measure retinal permeability in a rat model of diabetes. Advanced quantitative assessments such as this could substantially contribute to a better understanding of the pathogenesis of DR and identify potential drugs for treatment.

• 2334

Choroidal thickness in diabetic patients without diabetic retinopathy

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Purpose Compare choroidal thickness (CT) between diabetic patients without diabetic retinopathy (DR) and a non-diabetic group. Explore how CT relates to disease duration, mean arterial pressure (MAP), glycaemia, glycosylated haemoglobin (HbA1c), intraocular pressure and ocular pulse amplitude (OPA).
Methods In this cross-sectional study, CT was assessed using SD-OCT (Spectral Domain Optical Coherence Tomography) and enhanced depth mode at 13 different locations (subfoveal and 3 measurements 500 µm apart in all 4 directions - nasal, temporal, superior and inferior). Linear regression models were used to analyse the data.
Results 175 patients were recruited (125 diabetic patients without DR and 50 non-diabetics patients). In diabetic patients, CT was significantly thicker than in non-diabetic group in two locations: 1500 µm nasal (p=0.036) and 1500 µm superior to the fovea (p=0.021). CT was negatively associated with age (p<0.001) in both groups, but only in the diabetic group was it positively associated to OPA (with a mean increase in thickness between 8.5 and 11.6 µm for each increase of one OPA's unit). CT values seem to stabilize after 150 months of diabetes, with patients presenting higher glycaemia levels (> 160 mg/dl) while showing no fluctuation in neither HbA1c nor MAP.
Conclusions There appears to be a thickening of the choroid in diabetic patients without DR. Moreover, this tissue may be functionally different in diabetic patients, as the pattern of associations seems to differ between groups.

• 2335

Tomographic analysis of the retinal layers in diabetic macular edema treated with dexamethasone intravitreal implant

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Purpose To study the morphological alterations in the individual retinal layers of patients with diabetic macular edema (DME) treated with dexamethasone intravitreal implant.
Methods Retrospective, observational study of patients with center-involving DME treated with a single dexamethasone implant as primary or secondary treatment, and with at least two follow-up visits. Central thickness of each retinal layer was obtained with optical coherence tomography automated segmentation (Heidelberg Spectralis Engineering, Germany), with manual correction as needed.
Results Twenty one eyes of 18 type 2 diabetic patients were included (median HbA1c 7.1%). The median time of follow-up after treatment was 8 weeks (visit 1) and 4 months (visit 2). At visit 1, a significant reduction in central macular thickness (CMT) (480±24 to 325±134), retinal nerve fibre layer (RNFL) (21±1 to 18±2), ganglion cell layer (GCL) (30±2 to 22±1), inner nuclear layer (94±15 to 46±6), outer plexiform layer (OPL) (35±3 to 28±1), outer nuclear layer (ONL) (176±14 to 117±18) and retinal pigment epithelium (RPE) (29±7 to 15±5) was noted ($p<0.05$ for all layers). At visit 2 there was a significant increase in CMT, (424±270), although still lower than the baseline; there was also a significant increase in RNFL (25±3), GCL (30±3), OPL (40±3), ONL (146±20) and RPE (24±5) ($p<0.05$). There was no difference in inner plexiform layer (IPL) or outer retinal layers thickness over time. Seven eyes had neurosensorial detachment (NSD) at baseline, versus 0 at visit 1 and 2 at visit 2.
Conclusions The reduction in CMT noted in patients with diabetic macular edema treated with dexamethasone intravitreal implant is mostly due to resolution of NSD (which accounts to the automated RPE thickness) and the layers above external limiting membrane, except for IPL. This effect is highest at the first follow-up visit.

• 2336

Iluvien monotherapy for diabetic macular oedema in vitrectomised and non-vitrectomised eyes: one year data

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Purpose To assess the effectiveness of the Fluocinolone intravitreal implant (Iluvien) in patients with diabetic macular oedema (DMO) following previous pars plana vitrectomy (PPV) for proliferative diabetic retinopathy (PDR). The data from vitrectomised eyes are compared with a consecutive group of non-vitrectomised eyes with DMO who received the Iluvien implant in our institution.
Methods Retrospective analysis of a consecutive series of patients who received the Iluvien implant for DMO. Best-corrected visual acuity (BCVA) and central retinal thickness (CRT) were evaluated at baseline and 0-2 months, 3-5 months and 6-12 months following placement of the implant. Analysis of variance was carried out using Stata 14.1 (StatCorp LP) Software.
Results Seven eyes with recent PPV and 17 eyes without previous PPV received an Iluvien implant for DMO. Mean improvement in BCVA in the PPV group to 6-12 months was 0.33 logMAR (95% CI: -0.2-0.8) compared with 0.13 logMAR (95% CI: 0.0-0.2) in the no PPV group ($p=0.355$). Mean improvement in CMT in the PPV group to 6-12 months was 59.6µm (95% CI: 18.0-137.2) compared with 78.4µm (95% CI: 21.3-126.9) in the no PPV group ($p=0.745$). Individual OCT images showed persistent cystoid macular oedema in 7/7 eyes in the PPV group. A persistent pre retinal hyper-reflective line at the macula suggestive of residual cortical vitreous or pre retinal membrane was identified in 4/7 eyes in the PPV group and 9/17 eyes in the non-PPV group.
Conclusions Vitreoretinal interface proliferation may explain the absence of a response to intravitreal Iluvien in some DMO eyes. Prospective randomised studies are needed in order to establish a uniform evidence based approach for classification and treatment in vitrectomised eyes.

• 2337

Deep learning approach for diabetic retinopathy screening

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Purpose Diabetic retinopathy (DR) is the major cause of blindness in the working-age population. With an increasing number of diabetic patients worldwide, automated screening tools become indispensable. Recent progress in machine learning and image analysis enables efficient automated screening.
Methods DreamUp Vision uses state-of the art technology based on deep-learning. Our algorithm was trained on over 70000 labeled retinal images. Images were graded by ophthalmologists as follows: 0 (no retinopathy), 1 (mild non proliferative DR), 2 (moderate non proliferative DR), 3 (severe non proliferative DR) and 4 (proliferative retinopathy). Each patient in the dataset is represented by two images of left and right eyes. Grading is done for each eye image separately. Our algorithm performs quick and reliable detection of anomalies in retinal images, diagnoses their stage of diabetic retinopathy and provides the location of the anomalies detected in the pictures. We consider a patient as referable if the DR stage is between 2 and 4, otherwise we consider the patient as non-referable. We evaluate our model on over 10000 fundus images from 5000 patients taken from the Kaggle DR Detection Challenge dataset, provided by California Healthcare Foundation.
Results Our algorithm achieves an area under the receiver operating characteristic curve AUROC of 0.946 with 96.2% sensitivity (95% CI: 95.8 - 96.5) and 66.6% specificity (95% CI: 65.7 - 67.5) for identifying referable DR on the Kaggle dataset.
Conclusions The performances we have obtained enable a reliable automated DR screening. As the amount of available labeled data grows and given our technology's ability to learn from labeled images, we believe that significant performance improvement can be achieved. The same process can be applied to the detection of other eye diseases as well.
Conflict of interest
Any consultancy arrangements or agreements?:
DreamUp Vision Consultant

• 2338

Diabetic maculopathy screening in England; are we seeing too much?

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Purpose The England screening service classification of diabetic retinopathy has strict, quality assured criteria to identify potential diabetic maculopathy termed 'M1.' All new M1 cases identified by the screening service are referred to a hospital service. We aimed to evaluate the effectiveness of the England National Diabetic Eye Screening R1M1 classification of diabetic maculopathy as a criteria for secondary care referral in Portsmouth, UK.
Methods Retrospective audit of all patients referred to Portsmouth Hospitals NHS Trust with R1M1 pathology from April 2013 to January 2014. The total number of referrals received for this period was noted as well as the number of patients followed up in subsequent care pathways. Follow-up data on those who remained under hospital care is presented for three years.
Results A total of 306 diabetic patients were referred to Portsmouth Hospitals NHS Trust for R1M1 pathology over a 10 month period. At the first hospital appointment 135 (44%) had no fluid present on macular SD OCT and were either referred back to screening if the M1 features had resolved (65) or followed up with retinal images (70). 115 (38%) patients were considered to require further follow-up in secondary care. Of those patients remaining in secondary care 70 remained in active follow up 3 years later.
Conclusions These results would suggest that 44% of those with M1 features have no evidence of diabetic maculopathy on OCT at the initial hospital appointment and were discharged to community screening. Follow-up for over three years in a secondary care setting is required by 23%. Secondary service could be better utilised by streamlining referrals either by refining the R1M1 classification or developing community based OCT service

• 2341

Mistakes in the diagnosis of children intraocular tumors

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The first mistake is to consider normal a unilateral strabismus or a leucocoria in a baby or a child and don't performed a dilated funduscopy. Retinoblastoma is the first ocular tumor in childhood and often late diagnosed because professionals (pediatrician, GPs, or ophthalmologists) didn't believe parents that notice a white reflect in their kid's pupil. Clinically, on dilated fundus, one or more white tumors can be associated with exudative retinal detachment or subretinal or vitreal seedings. The disease can be unilateral or bilateral. Several forms can be more difficult to diagnosed (infiltrative retinoblastoma, inflammatory cellulitis associated with advanced retinoblastoma, neovascular glaucoma with buphtalmia associated with advanced retinoblastoma. The more frequent disorder that can stimulate retinoblastoma is coats disease especially in advanced forms, persistent hyperplastic primary vitreous, and other rare tumors (medulloepitheloima, leiomyoma or melanoma). The proper diagnosis can be done in referral centers with team trained to deal with these diseases and sometime with the help of US echography or MRI of the eye. In case of suspicion of ocular tumor, the child must be referred in emergency in a specialized center.

• 2342

Suspicious choroidal naevi: when to observe , when to treat

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To find and characterize all existing choroidal naevi, a systematic fundus examination with the indirect ophthalmoscope and the slit lamp using a non-contact or contact lens for detail are mandatory. These are ideally supplemented with optical coherence tomography (subretinal fluid, thickness and internal structure of lesions <1 mm thick), fundus autofluorescence (recent and chronic subretinal fluid, orange pigment), and ultrasonography (thickness and acoustic profile of lesions >1 mm thick). Despite such imaging, the challenge lies in telling a small melanoma from a naevus. The mnemonic 'To Find Small Ocular Melanomas' reminds us to look for tumour Tickness more than 2 mm, subretinal Fluid, visual Symptoms, Orange pigment and tumour Margin touching the optic disc. Each of these features roughly doubles the likelihood of growth and, hence, malignancy. None of them are specific though – about 8 percent of benign naevi have orange pigment and subretinal fluid, and naevi can grow slowly, especially in patients <45 years of age, whereas the smallest melanomas show none of these 5 features. Surveillance for growth, a biopsy, or both may thus be needed for a treatment decision. This talk will introduce these principles with examples.

• 2343

Difficulties in the diagnosis of achromic fundus lesions and hemorragic lesions

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Achromic choroidal lesions can be an achromic melanoma, a choroidal hemangioma or a metastasis.It is rarer to have scleritis ar the origin of an achromic chorodal mass but this can be seen in sarcoidosis rarely
Achromic choroidal melanomas are not rare. They are often mushroom shape and have a typical ultrasonographic aspect.In the presence of an achromic melanoma, it is always important to rule out the possibility of a metastasis by doing a chest and abdominal CT. Metastasis are easy to diagnose when they occur in a patient with known metastatic disease, when they are multiple or bilateral. They are trickier when they are unique with no known previous cancer. This is quite frequent in lung cancer where the choroidal mass is often the first manifestation
Choroidal hemangioma have a typical orange color and can be easily diagnosed by indocyanin green angiography (early hyper and wash out on the late phase)
Hemorragic mass are frequent in older patient, especially in case of diabetes and high blood pressure. If there is a doubt MRI with gadolinium injections or dopler ultrasonography can easily differentiate a hematoma from, a choroidal tumor

• 2344

Problems in the diagnosis of intraocular lymphoma

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Intraocular lymphoma means different entities. Primary vitreoretinal lymphoma can mascarade a chronic uveitis. This lymphoma is a subset of primary cerebral lymphoma. The disease is a B cell non hodgking lymphoma, aggressive, with a survival rate of less than 2 years after the occurrence of cerebral localization. Clinical examination, fluorescein angiography, OCT can be highly suggestive combined with resistance to corticosteroids. Diagnosis is based on cytokines levels (IL10/IL6) in aqueous humor or vitreous and diagnostic vitrectomy. Uveal localization of MALT lymphoma is rare and much more difficult to diagnose. This affection can mimic choroidal metastasis or a posterior scleritis or achromic uveal melanoma. The diagnosis can be suspected clinically (unpainfull choroidal thickening), hypoechogenic choroidal infiltration, typical aspect on ocular MRI. The diagnosis is based on episcleral, or choroidal biopsy.

• 2345

Indications and interpretation of various imaging techniques

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A large variety of imaging techniques are used in ocular oncology in order to document intraocular tumors.

The imaging of choroidal and retinal tumors is obtained either by digital or by scanning laser fundus cameras. Panoramic fundus pictures are obtained both with transpupillary or transscleral illumination.

Standard fluoresceine angiography and ICG as well as panoramic angiography (102° - 150°) are used according to the location of the tumors and the extend of the serous retinal detachment, in order to document the integrity of the outer and inner blood retinal barrier as well as the presence of retinal ischemia.

Retinal thickness, and serous retinal detachment in the macular area are studied with b-mode OCT and OCT "en face".

More recently, OCT-A provide useful informations on irradiation induced damage of the macula and optic disc.

The more appropriate technique has to be always used in order to obtain the best quality of imaging and avoid diagnostic errors.

• 2351

The αA-crystallin gene expression in differentiating lens fiber cells, FGF signaling, and transcriptional factories

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Purpose Embryonic lens development requires intricate temporal and spatial control of gene expression that is executed through specific gene regulatory networks regulated by FGF signaling. The αA-crystallin is the most abundant mammalian lens protein; transcriptional studies of this gene provide detailed insights into the molecular mechanisms governing lens fiber cell differentiation.
Methods Dynamic changes in chromatin structure and gene expression during lens developments were evaluated by a combination of RNA-seq and ATAC-seq. Expression of αA-crystallin (ch1) and other crystallins (Cryga, Crybb1, and Crybb3, localized on chromosomes 1 and 5, respectively) in individual nuclei of the developing mouse lens were analyzed by RNA-FISH. Transgenic mice with c-Maf promoter were generated and expression of EGFP was evaluated in mouse embryos. Localization of c-Jun, c-Maf, Etv5/ERM, and Pax6 was determined by ChIP using the c-Maf and Cryaa loci and mouse lens chromatin. Co-transfection experiments with c-Jun and Etv5 were conducted using c-Maf and αA-crystallin reporters.
Results Transcriptional factories, a subset of topologically associating domains (TADs), are formed between different crystallin loci in lens cell nuclei. These specific TADs are enriched by RNA polymerase II and other proteins. Novel FGF2-responsive region in the c-Maf promoter was found. Both c-Maf and Cryaa regulatory regions contain arrays of AP-1 and Ets-binding sites determined by ChIP assays.
Conclusions Collectively, these studies show that the lens fiber cell nuclei spatially organize crystallin loci into TADs, and that FGF signaling up-regulates expression of αA-crystallin both directly and indirectly via up-regulation of c-Maf. These molecular mechanisms are applicable for other crystallins and genes highly expressed in terminally differentiating lens fibers.

• 2352

Effects of histone acetylation on superoxide dismutase 1 gene expression in the pathogenesis of senile cataract

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Purpose Histone acetylation plays key roles in gene expression, but its effects on superoxide dismutase 1 (SOD1) expression in senile cataract remains unknown. To address this problem, the study was to investigate the influence of histone acetylation on SOD1 expression and its effects in the pathogenesis of senile cataract.
Methods Senile cataract was classified into three types—nuclear cataract (NC), cortical cataract (CC), and posterior subcapsular cataract (SC)—using the Lens Opacities Classification System III. Anterior lens capsule samples of cataract patients were obtained by continuous curvilinear capsulorhexis during cataract surgery. The intact lenses of normal New Zealand rabbits and B-3 HLECs were also cultured for intervene experiment. Western blot assay, quantitative real-time PCR, chromatin immunoprecipitation (CHIP)-PCR assay, immunofluorescence, CCK-8 and flow cytometry were applied to investigate the influence of histone acetylation on SOD1 expression.
Results In senile cataracts, SOD1 expression decreased significantly. Both H3 and H4 were deacetylated at -600 bp of the SOD1 promoter of cataract lenses, and hypoacetylated at -1500, -1200, and -900 bp. In hypoacetylated histones, the hypoacetylation pattern differed among the cataracts. In vitro, anacardic acid (AA) significantly reduced H3 and H4 acetylation at the SOD1 promoter, decreased protein expression, and induced cataract formation in rabbits. AA also inhibited HLEC viability and increased cell apoptosis. In contrast, trichostatin A (TSA) was able to efficaciously stop AA's effects on both rabbit lenses and HLECs. Decreased histone acetylation at the SOD1 promoter is associated with declined SOD1 expression in senile cataracts.
Conclusions Histone acetylation plays an essential role in the regulation of SOD1 expression and in the pathogenesis of senile cataracts.

• 2353

Evolution of cataract surgery. past, present and future

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Purpose Successful recuperation of vision of a blind eye (cataract?) after forceful rubbing of the eye (producing luxation of the lens?) has been mentioned in the Holy Bible in the 1rst Century (C.).
Methods In the 18th C. (1789) the aspiration of cataract was considered. In the 19th C. extracapsular cataract removal was practised but the formation of secondary cataract could not be prevented. In 1917 Prof. Ignacio Barraquer developed a suction cup to remove the cataract "in toto", only possible in case of mature cataract and weak zonule. In 1958 Joaquín Barraquer started to inject alphachymotrypsin into the posterior chamber for enzymatic zonulolysis permitting removal of the lens after two minutes. High optical correction was imperative.
Results Ridley recommended extracapsular extraction and introduction of a +20 D lens between the posterior capsule and the iris.Lens luxation into the vitreous cavity or the anterior chamber was a danger.Strampelli suggested a three-point anterior chamber lens but contact with the endothelium increased the danger of corneal decompensation.Binkhorst suggested iris fixation.
Conclusions At present, placement of the lens in the capsule, centered with the pupil, is preferred, permitting good near and distance vision without glasses.

• 2354

Genetic and phenotypic traits of staphylococcus epidermidis strains causing post-cataract endophthalmitis compared to commensal conjunctival flora

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Purpose The aim of this study was to evaluate the virulence and antibiotic resistance traits of ***S. epidermidis*** strains causing post-cataract endophthalmitis compared to those of the normal conjunctival flora in non-infected control patients.
Methods This prospective study included 22 patients (22 eyes) with acute post-cataract endophthalmitis and 72 uninfected control patients (72 eyes). Antibiotic susceptibilities were evaluated using the Vitek II® automated system. These strains were then tested for the presence of eight virulence genes (***icaA***, ***icaB***, ***icaC***, ***icaD***, ***atlE***, ***aap***, and ***capA),*** the insertion sequence IS256, and the ***mecA*** gene coding for methicillin-resistance.
Results Culture of 72 conjunctival samples collected from 41 patients allowed isolation of 43 ***S. epidermidis*** strains. The strains from the endophthalmitis group patients displayed higher prevalence rates for ***aap***, ***atlE*** and ***mecA*** genes carriage compared to those of the control group (77 % vs. 42%, p =0.007; 100% vs 79%, p = 0.02; and 54% vs 11%, p <0.001, respectively) and more frequently harbored simultaneously the ***mecA*** and ***icaA*** genes (13%) compared to the control group (2.3%, p=0.01). They were also significantly more resistant than control strains to methicillin, fluoroquinolones, and the aminoglycosides.
Conclusions A higher capacity of adhesion to intraocular lens and formation of biofilms, and a higher resistance to antibiotics were found in ***S. epidermidis*** strains causing post-cataract endophthalmitis compared to those of the normal conjunctival flora. The selection of such strains in endophthalmitis patients could be related to their specific virulence traits and/or their resistance to antibiotics used for prophylaxis of endophthalmitis.

• 2361

The genetic pathophysiology of dominant optic atrophy

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Inherited Optic Neuropathies are blinding diseases related to mitochondrial dysfunctions jeopardizing retinal ganglion cell (RGC) survival. There are two main forms: the Leber Hereditary Optic Neuropathy (LHON) related to mutations in the mitochondrial genome, and the Kjer dominant optic atrophy (DOA) related to mutations in nuclear genes.
Since the initial discovery of the ***OPA1*** gene in 2000 as the major gene causing DOA, the use of WES and re-sequencing chips disclosed many novel genes responsible for DOA. Interestingly, most of them are involved in mitochondrial dynamics, suggesting that the equilibrium between fission and fusion is crucial for RGC physiology. In this respect, using fluorescence and electron microscopy, we showed that the structure of mitochondria is drastically different according to the myelination status of RGC axons, possibly correlating anterograde and retrograde mitochondrial transport to mitochondrial dynamics. Further metabolomics analysis of an Opa1 mouse model identified specific signatures in the plasma and optic nerve, emphasizing the consequence of mitochondrial shape on metabolic pathways, and revealing biomarkers of the disease.

• 2362

Looking for a sensitive biomarker for genetically determined neurodegenerative diseases through the window of the eye

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Looking for a sensitive biomarker for genetically determined neurodegenerative diseases through the window of the eye.
Biomarkers are valuable tools offering quantifiable objective measures for biological processes. In neurodegenerative diseases mitochondria are frequently either primarily or secondarily involved, but the difficulty in directly assessing the target tissue and the frequently slow progression makes the search for reliable, convenient, sensible, specific and objective biomarkers a particularly relevant issue. The visual system is the primary target where mitochondria dysfunction frequently manifests itself. The definition of a typical, objective, quantifiable pattern of neuro-ophtamological alteration that shows correlation with clinical measures and is sensible to progression may be very important. We had previously identified by advanced neuroimaging and OCT specific changes discriminating patients from controls in f hereditary spastic paraplegia (HSP) and Friedreich's ataxia (FRDA) patients. We now tested these approaches for their ability to provide timely information on disease progression by evaluating longitudinally 21 HSP and 12 FRDA patients.

• 2363

OCT angiography in mitochondrial optic neuropathies

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We evaluated peripapillar and optic disc vessel density (VD) in mitochondrial optic neuropathies (MON) and we correlated them with functional and anatomical parameters. Patients affected by Dominant optic atrophy (DOA), Leber's hereditary optic neuropathy at the acute stage (LHONa), at the chronic stage (LHONch) and carriers (LHONc) were analyzed. Different changes in VD were detected in patients affected by MON and were correlated with different stages of the disease and with functional and structural parameters. VD could be a useful parameter for the monitoring of the disease and of the future therapeutic approaches.

• 2364

Perturbed mitochondrial homeostasis in LHON: a new target for rescue strategy

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Leber's hereditary optic neuropathy (LHON) is the most frequent mitochondrial disease due to mitochondrial DNA mutations affecting complex I. The pathogenic mechanism includes complex I deficiency leading to reduced ATP synthesis, increased reactive oxygen species production and lowered threshold for apoptosis. Cell compensatory mechanisms include activation of mitochondrial biogenesis, but also increased removal of damaged mitochondria by mitophagy. The balance between "mito-bioegenesis" and "mito-phagy" is key to mitochondrial homeostasis and efficient compensation, driving incomplete disease penetrance. These mechanisms reflect on the function of retinal ganglion cells (RGCs), the disease cell target, where increased mitochondrial organelles need to be transported along the axons. Ultimately, axonal traffic jam of mitochondria may result in a catastrophic series of events leading to RGCs degeneration. The master regulation impinging on mito-biogenesis and mito-phagy is a crucial crossroad for sensing mitochondrial dysfunction and is the target for therapeutic approaches aimed at modulating mito-biogenesis and mito-phagy, inhibiting apoptosis, and correcting or bypassing complex I dysfunction.

Conflict of interest
Any consultancy arrangements or agreements:
Consultant for GenSight, Santhera, Edison Pharmaceuticals and Stealth Peptides

• 2365

Personalised therapies for mitochondrial optic neuropathies - myth or reality?

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Mitochondrial optic neuropathies affect an estimated 1 in 10,000 individuals in the population and as a group, it represents an important cause of chronic visual morbidity among children and young adults. The pathological hallmark is the preferential loss of retinal ganglion cells (RGCs) within the inner retina, which results in progressive optic nerve degeneration and the onset of visual symptoms. The past decade has seen tremendous progress in our understanding of the molecular genetic basis and pathophysiology of this group of disorders, providing at the same time invaluable insight into the shared disease pathways that precipitate RGC loss. The two classical paradigms are Leber hereditary optic neuropathy (LHON), which is a primary mitochondrial DNA (mtDNA) disorder, and autosomal dominant optic atrophy (DOA) secondary to pathogenic mutations within the nuclear gene *OPA1* that encodes for a mitochondrial inner membrane protein. The stark reality is that the majority of patients with mitochondrial optic neuropathies are eventually registered legally blind and management remains largely supportive. The translational gap for this group of disorders still remains to be bridged, but the development of effective disease-modifying treatments is now within tantalising reach helped by major advances in drug discovery and targeted genetic manipulation.

Conflict of interest
GenSight Biologics – Consultant

• 2371

The ocular surface anatomy under cover - its interaction with a scleral lens

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Scleral Lenses represent the historic type of a large rigid ´foreign body´ that rests on the sclera, vaults over the cornea thus keeps the main parts of the ocular surface ´under cover´. However, in contrast to ordinary large soft CL that are in direct contact with cornea and conjunctiva, scleral lenses are in most parts physically separated from the ocular surface epithelia. Their lens vault forms a dome-like region over the ocular surface. It is filled by tear fluid and thereby allows to constantly moisten the cornea within its own physiological bathing solution. This special ´tear bandage´ has various advantages on ocular physiology and its natural healing capacities, that may be explained by a plethora of metabolically active ingredients in the tears. Modern lens materials & designs make sclerals an easy to use and versatile tool for daily practise with ideal wearing comfort and medical safety. Therefore, sclerals are a highly underestimated medical tool in an ´under cover mission´ at the ocular surface.

• 2372

Keratokonus - the killing application for most contact lenses is the prototypical job for sclerals

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Use of blown glass shells, the precursors of scleral lenses, for management of keratoconus was first described in the late 1800's. Keratoconus has been a leading indication for scleral lenses throughout the history of the devices, both prior to and following the introduction of rigid gas permeable scleral lenses in 1983. Scleral lenses offer several benefits compared to corneal lenses for primary corneal ectasia. They do not require alignment with a highly irregular corneal surface, and are instead supported by the conjunctival tissue overlying the relatively regular sclera. They offer excellent comfort and lens stability. Scleral lenses do not touch the cornea, so may be less likely to lead to corneal epitheliopathy or scarring. Unlike corneal transplantation, scleral lenses can immediately provide improvement in the quality of vision, and are considerably less invasive. Furthermore, scleral lenses may provide improved ocular comfort for patients with concurrent keratoconus and atopic disease of the lids and adnexa. This presentation will review and summarize visual and ocular outcomes of scleral lens therapy for management of exposure keratopathy at the Mayo Clinic.

• 2373

It´s not just keratokonus - some general fitting techniques for scleral lenses in so many scenarios

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Scleral lenses are receiving wide attention and traction among clinicians treating complex corneal disease for numerous reasons. The fact that they provide same benefits of a gas permeable rigid optical surface as corneal RGPs, renders them a viable alternative to treat distorted corneas. However, the fact that they vault the cornea, rest entirely on the sclera and hold a fluid reservoir over the cornea expands the use and benefits these lenses offer when treating ocular surface disease. Providing the cornea with the appropriate microenvironment to promote healing and protecting the ocular surface from the environment or lids and lid margins, these lenses are proving to be a powerful tool for the treatment of complex corneal disease, even in cases recalcitrant to conventional therapy, surgical and/or topical. We show cases where scleral lenses have been successful in treating not only RGP failures for distorted corneas, but also in cases of severe dry eye secondary to GVHD, Sjorgrens, rheumatoid arthritis, in limbal stem cell deficiency from SJS and chemical burn, in neurotrophic keratitis from Familial Dysautonomia, HSV, diabetes, acoustic neuroma, and severe exposure from facial paralysis, and/or trauma.

• 2374

Moderate to severe dry eye - a promising indication for scleral lenses

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The space between the scleral lens and the ocular surface is called the reservoir and can be filled with aqueous agents, thus allowing for a permanent hydration of the cornea. This property is a major advantage of scleral lenses in dry eye. Furthermore, the lenses protect the epithelium from lid frictions and may also promote corneal epithelial growth. Finally, scleral lenses decrease sensory nerve stimulation, decreasing symptoms, even in moderate dry eye patients.

• 2375

Are scleral lenses safe for the meibomian gland?

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Nowadays, we are experiencing scleral lens rebirth through the development of new designs and materials respecting the anterior ocular surface represented by the cornea, the limbus and the anterior bulbar conjunctiva. But what about the posterior ocular surface, represented by the tarsal conjunctiva, the lid margin and meibomian glands? The interaction of the scleral lens with the posterior ocular surface will be assessed clinically in keratoconus patients wearing scleral lens for more than 2 years and compared in a randomized manner with soft lens, hybrid lens and corneal rigid gas permeable lens wearers and with control sample. Lid wiper epitheliopathy grade, tear film break up time, quality of meibum and meibomian gland trophicity will be compared between different groups...

Conflict of interest
Any Stocks or shares held by you or an immediate relative:
I'm local representative of Microlens®, dutch scleral lens manufacturer.

• 2381

Ca2+ activity during ATP-induced tone changes in porcine retinal arterioles in vitro spreads along the processes of perivascular cells

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Purpose Recently, a novel population of perivascular cells (PVC) located immediately external to the vascular smooth muscle cells of retinal arterioles has been identified. These cells display Ca2+ activity simultaneously with tone changes of retinal arterioles and have processes extending into the retina. This data suggests that PVCs could play a role in the neurovascular coupling in the retina. The aim of the study was to investigate Ca2+ signals in PVCs and their processes during successive contraction and relaxation of retinal arterioles induced by ATP.
Methods First order porcine retinal arterioles with preserved perivascular retinal tissue were mounted in a confocal myograph and loaded with the Ca2+-sensitive fluorophore Oregon Green. The arterioles were preconstricted with 5*10-8 – 10-6 M U46619 and after the addition of ATP (10-4 M) intracellular fluorescence from the PVC layer was recorded by a confocal microscope simultaneously with the vascular tone.
Results ATP induced a biphasic tone response in 19 % (5 out of 26) of the studies arterioles. The tone response consisted of 15±4% initial contraction followed by 30±20% relaxation. ATP induced Ca2+ waves in 49±16 % PVCs and 46±14 % processes during the contraction and in 46±16 % PVCs and 46±14 % processes during the relaxation. There was no significant difference between the frequency of Ca2+ waves in PVCs and their processes during contraction and relaxation ($p>0.05$), but the amplitude of Ca2+ waves was significantly higher ($p<0.01$) during contraction than during relaxation in the two structures.
Conclusions PVC Ca2+ waves associated with contraction and relaxation of porcine retinal arterioles spread along cellular processes. The amplitude of Ca2+ waves in PVCs and their processes can be used to differentiate contracting and relaxing responses of retinal arterioles.

• 2383

Automatisation and improved repeatability of retinal oximetry

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Purpose To develop and test an automatic method for analysing retinal oximetry images.
Methods The dual-wavelength Oxymap T1 oximeter captures images for calculation of oxygen saturation in retinal vessels. Images were taken of healthy subjects for testing of repeatability and sensitivity, the latter during 100% O2 breathing (n=21). Images were also taken of patients with diabetes and no DR (n=16) and patients with non-proliferative DR (n=24). The diabetic groups were compared with 54 healthy subjects. Semi-automatic and fully automatic computer programs were used for analysis. The main differences are: The automatic program automatically categorises vessel points into arterioles and venules and then gives averages for each retinal image. The automatic program uses all pixels on vessel cross-sections for calculations.
Results For arterioles in healthy, the standard deviation between repeated measurements was 0.98 percentage points (pp) with the semi-automatic method but 0.66pp with the automatic method. The corresponding values for venules were 1.99pp (semi-auto) and 1.50pp (auto). The automatic program detected an increase of 5.1pp in arteriolar saturation and 17.4pp in venules when healthy subjects inhaled pure oxygen ($p<0.0001$ in both cases). Similar values were found with the semi-automatic software. Higher venous saturation was detected in patients with non-proliferative DR ($p<0.05$ with both programs). Values (mean±SD) from the automatic software were 68.5±5.6% (NPDR), 63.3±6.0% (DM but no DR) and 64.9±4.7% (healthy).
Conclusions Automatic analysis of retinal oximetry images yields good repeatability. The automatic method is sensitive to changes in saturation during 100% O2 breathing and detects higher venous saturation in diabetic retinopathy. Automatic analysis is much faster than the semi-automatic approach and is less subjective.

Conflict of interest
Any post or position you hold or held paid or unpaid?:
Oxymap ehf. supported a university posititon that I held, several years ago (no longer in effect).
Any consultancy arrangements or agreements?:
I have close collaboration with the company Oxymap ehf. when it comes to development and testing of retinal oximetry. This started before Oxymap ehf. was founded, i.e. when the technical part of the project was within the University of Iceland. The second author is an employee of Oxymap ehf. and the last author is on the board of Oxymap ehf. I am not paid by Oxymap ehf.
Any Stocks or shares held by you or an immediate relative?:
I have (limited) stocks in the company Oxymap ehf., which makes the instrument and software that we use. The second and last authors also have stocks in the company.
Any research or educational support conditional or unconditional provided to you or your department in the past or present?:
My group receives software (and hardware) from Oxymap ehf. for testing and clinical studies.

• 2382

Vasodilation by cell membrane permeable but not impermeable carbonic anhydrase inhibitors of precontracted retinal arteries

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Purpose Carbonic anhydrase inhibitors (CAI's) are used to lower intraocular pressure in glaucoma. Some have also been found to elevate retinal and optic nerve PO2 and cause vasodilation of retinal arteries. But the mechanism causing the vasodilatation is unknown. The aim is to identify which carbonic anhydrase isoenzymes are involved in control of vascular tone, and whether located intracellularly or on the surface of cell membranes. Selective membrane permeable and impermeable CAI's were used for this purpose.
Methods Dissected segments of porcine retinal arteries were mounted in a wire myograph for measurement of contractile activity and precontracted with 10-6 M U-46619, a prostaglandin analog, added to the organ bath. With the vascular tone stabilized the CAI's tested were applied separately to the bath, and the effects of each on the tone recorded. Results are presented as mean ± SEM percentage of the maximum vasodilation, as compared to the prior vasoconstriction per mm, induced by 10-6 M U-46619.
Results The membrane permeable CAI dorzolamide (10-3 M) induced a mean relaxation of porcine retinal arteries by 76 ± 8% ($P< 0.02$) when precontracted with U-46619. Benzolamide, considered a membrane impermeable CAI, induced a significant mean relaxation of 85 ± 8% ($P< 0.01$) at 10-3M after U-46629 induced vasoconstriction; this relaxation was dose-dependent. The pyridinium derivative FC5-207A (10-3M), a membrane impermeable CAI, had no effects on the vascular tone of retinal arteries precontracted by U-45519, at any dose tested.
Conclusions Membrane permeable carbonic anhydrase inhibitors induce vasodilation in precontracted porcine retinal arteries, while membrane impermeable inhibitors do not, suggesting that cytosolic isoenzymes are involved in mediating the vasodilation. The results indicate that benzolamide is probably a membrane permeable CAI.

• 2384

Correlation between retinal and mixed venous oxygen saturation

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Purpose To investigate the correlation between mixed venous (SvO2) and retinal vessel (SrO2) oxygen saturation, using non-invasive spectroscopy in pre- and post-heart transplant patients.
Methods Retinal oxygen saturation and vessel caliber were measured in dark-adapted patients, breathing ambient air in a seated position, using dual wavelength retinal oximetry, within 24h of a SvO2 sampling during right heart catheterization. Correlations were analyzed using Pearson correlation coefficients and linear regression models.
Results Twelve patients aged 57.4±18.2 years were analyzed. A strong negative correlation was found between retinal arteriovenous oxygen difference and SvO2 ($r= -0.64$, $P= 0.024$), as well as between retinal arterial diameter and time since heart transplantation ($r= -0.77$, $P=0.009$), independent of demographic and systemic parameters.
Conclusions Retinal oximetry provides a non-invasive method to visualize and quantify the oxygen saturation of arteries and veins of the central circulatory system. This pilot study provides proof of concept for the use of retinal oximetry in the follow-up of patients after heart transplantation, to assess cardiac function as well as cardiovascular health.

• 2385

The effect of systemic tamsulosin hydrochloride on choroidal thickness and pupil diameter sizes

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Purpose To evaluate and investigate the effects of α1-adrenoceptor antagonist tamsulosin hydrochloride on anterior and posterior segment findings using Sirius Scheimpflug/Placido photography-based topography system and enhanced depth imaging spectral-domain optical coherence tomography (EDI-OCT).
Methods This prospective study was performed with newly diagnosed benign prostatic hyperplasia, 25 eyes of 25 patients, initiated tamsulosin hydrochloride, were evaluated in this study. Anterior segment and posterior segment findings were noted at baseline, 1st and 3rd month. Results were compared statistically.
Results The mean subfoveal choroidal thickness 269.65 µm, and the mean 3 mm nasal and temporal thicknesses were 262.85 and 264.70 µm respectively at baseline and they were 270.15 µm, 263.15 µm and 264.95 µm at 1st month and they were 270.75 µm, 264.05 µm and 265.90 µm at 3rd month (P>0.05, at all study visits). The mean schirmer test values were 13.10-12.35 and 10.95 mm, respectively (p<0.001). The mean scotopic, mesopic and photopic pupil diameter values were 6.60 mm, 5.11 mm and 3.48 mm at baseline, and they were 6.58mm, 5.10 mm and 3.44 mm at 1st month and 6.51 mm, 5.06 mm and 3.45 mm at 3rd month (p>0.05).
Conclusions Significant increase of subfoveal choroidal thickness was not detected. But tamsulosin effected the mean nasal and temporal choroidal thicknesses during study period. There were no significant decreases of scothopic, mesopic and photopic pupil diameter sizes in pupillography, it can be considered that tamsulosin doesn't effect pupil size.

• 2386

The assessment of Ocular Blood Flow with Laser Speckle Flowgraphy in healthy Caucasian

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Purpose To evaluate the reliability and feasibility of the Laser Speckle Flowgraphy (LSFG) measurement of ocular blood perfusion in a group of healthy Caucasian descents and to explicate the age-dependence of the obtained parameters.
Methods A population of 80 eyes of 80 healthy, non-smoking subjects of Caucasian descent aged between 19 and 79 years was included in this cross-sectional study. A commercially available LSFG system was used to measure optic nerve head (ONH) blood flow three successive times in both miosis and mydriasis. The mean blur rate (MBR), a measure of relative blood flow velocity, was obtained for three regions of the ONH. Additional pulse-waveform derived perfusion parameters including blowout score (BOS) and falling rate (FR) were also recorded.
Results The success rate of LSFG measurement was 93.8% in miosis and 98.8% in mydriasis (p=0.004). Measurements of MBR showed excellent repeatability with intraclass correlation coefficients ≥ 0.937 and were not affected by pupil dilation. The majority of pulse-waveform derived parameters showed good repeatability. MBR-related blood flow indices exhibited significant age dependence (p<0.001). FR (r=0.706, p<0.001) and blowout time (BOT; r=-0.698, p<0.001) most strongly correlated with age.
Conclusions LSFG represents a fast and reliable method for the quantitative assessment of ocular blood flow in Caucasian subjects. Our data confirm that the LSFG-derived variables FR and BOT can be useful biomarkers for age-related changes in ocular perfusion.

• 2387

Quantitative assessment of retinal permeability in the diabetic Akimba mouse: validation of a promising animal model for diabetic retinopathy

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Purpose Unravelling the pathogenesis of diabetic retinopathy (DR) remains largely elusive, mainly due to lack of reliable diabetic animal models. The Akimba mouse (Ins2AkitaVEGF+/-) was generated by crossing Akita (T1D) with hVEGF-overexpressing Kimba mice. The aim of this study was to validate this innovative diabetic model as a quantitative in vivo screening tool for anti-leakage therapeutics in the context of DR.
Methods Fluorescein angiography (FA) and OCT were implemented to assess retinal permeability and edema in Akimba compared to WT. FITC-BSA perfusion and immunohistochemistry (IHC) were performed as well. Metamorph software (Leica) was used for quantitative analysis. The efficacy of anti-VEGF therapy was investigated in Akimba mice via intravitreal injection of anti-VEGF or vehicle.
Results We report for the first time that quantitative analysis of FA images and FITC-BSA perfused flatmounts revealed a significant increase of vascular leakage in the Akimba eye compared to WT. Analogous to the clinical DR situation, edema can be discerned in OCT scans of Akimba eyes. The effect of anti-VEGF was monitored via longitudinal FA follow-up before and 2-4 weeks after treatment. Anti-VEGF treatment induced a significant decrease in vascular leakage (approx. 35%). IHC stainings confirmed that Akimba also exhibits other DR hallmarks such as inflammation, angiogenesis and fibrosis.
Conclusions Current study demonstrated that the Akimba mouse is a powerful model for screening therapeutics against sight-threatening retinal edema. This diabetic model also exhibits other main DR-related processes, signifying the relevance of the Akimba model for DR research. Further validation will be crucial to strengthen the toolbox of in vivo DR models and ultimately to address the unmet need for effective next generation therapies for DR.

Conflict of interest
Any post or position you hold or held paid or unpaid?:
I'm a scientist working for the Belgian ophthalmology company ThromboGenics NV

• 2611

Controversies between retinal dystrophies and uveitis - the point of view of the retina specialist. Does electrophysiology help?

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Purpose To describe cases in which both genetically determined and acquired inflammatory retinal disease can be suspected.
Methods A case presentation format will be used to illustrate different genetically determined and acquired conditions leading to similar phenotypes of retinal dysfunction.
Results Phenotypes of genetically determined diseases can mimic and overlap those of acquired conditions of the inflammatory and paraneoplastic type. Using a combination of detailed patient history taking, specialized imaging, psychophysics and electrophysiology, disease in most patients can be classified as either probably genetic or acquired.
Conclusions Taking a thorough history in combination with an extensive clinical examination and psychophysical and electrophysiological tests most often allows to make a specific diagnosis, although an exact diagnosis in some cases remains elusive. The presentation will examine various aspects of inflammatory and inherited disease using a case based approach. The similarities and differences between the electrophysiology of retinal dystrophies and inflammatory disorders will be discussed. The particular role of electrophysiology in the management of birdshot retinochoroidopathy, a disorder with an unpredictable course that is highly variable from patient to patient, will be addressed; ERG data are used to monitor the efficacy of treatment and facilitate management decisions in relation to treatment dose and nature. True unilateral retinitis pigmentosa is rare but exists; the topic of unilateral pigmentary retinopathy, which can often be post-inflammatory, will also be examined.

• 2612

Controversies between retinal dystrophies and uveitis - the point of view of the uveitis specialist. Does retinal antibody detection help?

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Many diseases, presumed to be mediated by autoimmune mechanisms, may have clinical picture suggestive of retinal dystrophies. The paradigm of such cases is illustrated by cancer associated retinopathies. However the spectrum of antibody mediated retinopathy is expanding and non neoplastic forms are grouped under the name autoimmune retinopathy (AIR). However, the difficulties to demonstrate the presence of retinal antibodies, as well as their presence in control and retinal dystrophy patients render the diagnosis very challenging. In this talk, we will, through case reports, illustrate the potential usefulness and pitfalls of antiretinal antibody search in the management of such cases.

• 2613

Controversies between lymphoma and uveitis - the point of view of the ophthalmologist

TOUITOU V
Hopital Pitie-Salpetrière, Paris, France

Diagnosis of primary vitreoretinal lymphoma (PVRL) is often challenging. One of the reasons of this challenge relies on the absence of specificity of the clinical signs (masquerade syndrome mimicking uveitis), the low number of cells in the vitreous, and its fragility leading to rapid degradation of the cells during or after vitrectomy. Anterior chamber cytokine dosage provides important informations regarding the screening of patients suspect of PVRL. It also proved to be a valuable tool to detect early relapses of patients during the follow-up. New molecular diagnostic tools or new biological scores based on intraocular cytokine dosage have been developed to increase the yield of cytokine level measurement and help in the decision to propose diagnostic vitrectomy. It may also be helpful to evaluate the ocular response to treatment in order to tailor the therapeutic strategy for each patient.

• 2614

Controversies between lymphoma and uveitis - the point of view of the neuro-oncologist

TOUITOU V , HOUILLIER C
Hopital Pitie-Salpetrière, Paris, France

It has been shown that elevated level of IL10 with an IL10/IL6 ratio greater than 1 is very evocative of Primary Vitreo Retinal Lymphoma (PVRL). However, other causes of uveitis can be accompanied with increased IL10 level, and on the other hand some pateints with PVRL may be characterized by normal levels of intraocular IL10 ((intraocular T-cell lymphoma or subretinal lymphoma without vitreous infiltration). Currently, the decision to treat the patients cannot be based on the sole basis of increased IL10 level in aqueous humor. Systemic chemotherapy or radiation therapy can be associated with severe side effects, especially in elderly patients. In patients with a negative cytological analysis of the vietrous, the role of increased intraocular cytokines in the aqueous humor for the therapeutic decision is very debated and is currently not sufficient in order to confirm the diagnostic. However, the role of intraocular cytokine dosage in the aqueous humor to follow-patients during and after treatment has to be discussed.

• 2615

Controversies between how to handle uveitis and glaucoma. The point of view of the uveitis specialist

KESTELYN P
UZ Gent, Ophthalmology, Gent, Belgium

Uveitic glaucoma is often associated with high pressures and may damage the optic nerve faster than other forms of glaucoma. Therefore, early diagnosis and adequate treatment are essential. The key to successful treatment is an understanding of the pathogenetic mechanisms (secondary open-angle, secondary angle closure, forward rotation of the ciliary body, etc.) Moreover, one should realize that combined mechanisms are more common in uveitic glaucoma than in other forms of glaucoma. Steroid-induced pressure rise is common in uveitis patients and should be dealt with in a proper way: do not cut on steroids, but treat the glaucoma agressively. In those patients who have chronic uveitis and are steroid responders, surgery is a better option than medical treatment. Tubes are preferred over trabeculectomy with mitomycin in eyes with chronic inflammation. Contrary to some recommendations, prostaglandins should not be avoided in uveitis patients for fear of cystoid mcular oedema. They should be avoided however in uveitis of herpetic origin.

• 2616

Controversies between how to handle uveitis and glaucoma. The point of view of the glaucoma specialist

BRON A
Dpt of Ophthalmology, Dijon, France

Raised intraocular pressure and glaucoma are frequently seen in uveitis, and may represent a serious complication. Inflammatory substances released during uveitis and the treatments used, mainly corticosteroids, probably alter the normal anatomic structure of the anterior chamber and angle, influencing aqueous dynamics.
The clinical presentations may vary according to the irido-corneal angle. In angle closure, iris bombé is well recognised due to the acute elevation of IOP. However when the angle remains open, a careful monitoring of IOP and optic nerve head are needed, because the evolution is more insidious. Therefore gonioscopy is the key examination in the diagnosis and management of secondary IOP elevations and glaucomas and allows an appropriate treatment.

Conflict of interest
Any consultancy arrangements or agreements:
Allergan, Bausch Lomb, Théa

Any research or educational support conditional or unconditional provided to you or your department in the past or present:
Horus, Théa

• 2621

OCT in AD

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Alzheimer's (AD) and Parkinson's Disease (PD) are the most common cause of dementia characterized by progressive deterioration in cognitive function.
These neurodegenerative disorders present ocular manifestations which could precede systemic signs and symptoms of disease. Correlations between the eye and the brain have been confirmed by recent advances in imaging technologies such as Optical Coherence Tomography (OCT). Hardware and software improvements have given the possibility of examining structures previously inaccessible. Retinal Nerve Fibre Layer (RNFL) thinning has been recognised to occur in both AD and PD and OCT segmentation software are now available as an aid for understanding the involvement of retinal layers other than the RNFL in these pathological processes.
The aims of this talk is to explore the current application of OCT retinal imaging in AD and PD. Additionally, novel OCT applications will be discussed to generate a multidisciplinary debate.

• 2622

Retinal structure in Down's syndrome; potential markers of Alzheimer's disease

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The purpose of this study is to investigate degeneration and apoptosis of retinal cells in people with Down's syndrome (DS) and the relationship with aging. People with DS have a high risk of developing early-onset Alzheimer's disease (AD) with an increasing age-related prevalence.
Spectral-domain optical coherence tomography (SD-OCT) was used to investigate the structure of the retina in 51 people with DS between the ages of 18 and 56. Thickness and volume of the retinal layers has been compared to that of age-and-sex-matched healthy control participants. SD-OCT has not been used in a large DS study previously and our results show significant differences between the DS and control retinal structures. We found that people with DS had significantly thicker RNFL in all quadrants ($p<0.001$) apart from the nasal quadrant. DS group also had significantly greater retinal volume than the control group ($p<0.001$).
This finding is unexpected as research from the AD population shows thinning retinal layers and decreased retinal volume. Conclusions will be discussed and relationships with age and cognitive function explored. Future work will investigate the rate of apoptosing cells in the retinas of DS.

• 2623

Fluorescence lifetime imaging

DYSLI C
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Abstract not provided

• 2624

Auto fluorescence

HERMANN P
University of Bonn, Bonn, Germany

Abstract not provided

• 2631

Update in Graves' Orbitopathy

LUDGATE M
Cardiff University School of Medicine, Cardiff, United Kingdom

Thyroid eye disease or Graves' orbitopathy (GO) is an autoimmune condition most common in people with hyperthyroid Graves' disease (GD). GD is caused by thyroid stimulating antibodies which bind the thyrotropin receptor (TSHR). The TSHR is probably also implicated in GO since it is expressed in orbital fat, particularly during adipogenesis. GO is the result of tissue remodelling, mainly overproduction of extracellular matrix and excess adipogenesis, which together produce proptosis. In vitro models have increased understanding of the signalling cascades regulating these processes and identified possible novel treatments. However progress in identifying the triggers of the autoimmune response is lacking but a possible role for the microbiome has been proposed. Hopefully recent developments, including a TSHR induced model of GO in mice, will help to address these issues.

• 2632

Differential Diagnosis of Graves' Orbitopathy

BALDESCHI L
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Abstract not provided

• 2633

Euthyroid Graves' Orbitopathy

BOSCHI A
Cliniques Universitaires St. Luc, Ophtalmologie, Bruxelles, Belgium

Euthyroid GO is defined as an orbitopathy without present or past thyroid dysfunction Euthyroid GO is a rare condition (+/-10% of GO).
The phenotype of Euthyroid GO is still undetermined. Usually reported as a unilateral mild and poorly active GO, but no difference between GO with or without thyroid dysfunction have also been described. Antibodies anti-TSH receptors, as imaging, usually contribute to the diagnosis.
We will review and discuss the clinical, radiological and biological features that are helpful for differential diagnosis

• 2634

Update in medical management of Graves' orbitopathy

SALVI M
Graves' Orbitopathy Center, Milan, Italy

Management of GO must be based on the assessment of activity and severity of the disease. Activity is usually assessed with the Clinical Activity Score (CAS), while severity is classified, according to EUGOGO as mild, moderate-to-severe and sight-threatening. Prompt restoration of stable euthyroidism is recommended in the presence of GO. In moderate-severe disease, steroids have been widely employed because of their anti-inflammatory activity, although 20-30% of patients are not responsive or present with disease reactivation at the end of therapy. Some novel immunosuppressors have been employed in clinical studies and showed interesting results. Potential targets for therapy in GO are the TSH and the IGF-1 receptor on the fibroblasts, inflammatory cytokines, B and T cells and the PIK3/mTORC1 signaling cascades for adipogenesis. A recent open study has shown that tocilizumab, an anti-sIL-6R antibody, inactivates GO. Consistent data on the efficacy of rituximab have been reported over the past decade and more recently in randomized controlled trials. The availability of new therapies will expand the therapeutic options for GO patients and allow clinicians to really personalize the treatment to better suit the patients' unmet needs.

• 2641

General structure and function of the retina

GRZYBOWSKI A

University of Warmia and Mazury, Dept. of Ophthalmology, Olsztyn, Poland

The invention of the ophthalmoscope in the 19th century led to the development of ophthalmology as a discipline. The retina is an accessible part of the central nervous system and has consequently been studied extensively. There is now a growing use of OCT to obtain information related to brain neurodegenerative disorders like multiple sclerosis, Alzheimer's and Parkinson diseases as well as migraine.
Two aspects of human retinal structure based on physiology and morphology can be distinguished. They are the various retinal layers that consist of either neuron perikarya or neuronal processes. The other, is the distinction between central (macula, fovea) and periphery parts of the retina. Major cell-types in the retina are pigment epithelial, photoreceptor, horizontal, bipolar, amacrine, ganglion and glial cells and an understanding of their roles in healthy and unhealthy retina remains a challenge. Ocular photoreception for example, was thought to be mediated exclusively by rods and cones until the beginning of the 21st century and only recently have photosensitive retinal ganglion cells (pRGCs) been discovered. The aim is to discuss certain aspects of retinal structure related to function.

• 2642

Retinal vasculature structure and function

SCHMETTERER L

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The human retina has a complex vascular supply. The inner retina including the retinal ganglion cells is supplied by the retinal circulation, the outer retina including the photoreceptors is supplied by the choroidal circulation. Whereas the retinal circulation is characterized by high vascular resistance, low blood flow rate and high arterio-venous oxygen difference the choroidal circulation is characterized by low vascular resistance, high blood flow rate and low arterio-venous oxygen difference. The choroidal vessels are richly innervated and as such blood flow is under neural control. The retinal vessels distal to the central retinal artery are not innervated. The optic nerve head has a particular vascular supply: the anterior vessels receive their input via the central retinal artery, the posterior vessels receive their input via the posterior ciliary arteries. An overview of the anatomy and physiology of the ocular vasculature is provided.

• 2643

The RPE/photoreceptor complex

OSBORNE N

Oxford University, Nuffield Laboratory of Ophthalmology, Oxford, United Kingdom

The retinal pigment epithelium (RPE)/ photoreceptor complex constitutes the choroid, Bruch's membrane and the photoreceptor outer segments. The RPE interacts with Bruch's membrane and the photoreceptors, which it faces across the sub-retinal space. In these interactions the RPE acts as three types of cell - epithelium, macrophage, and glia. There are a number of selective interactions between the choroid, Bruch's membrane, RPE and photoreceptors related to ion and water transport, vitamin A transport, phagocytosis of shed portions of outer segments, ensheathment of photoreceptors outer segments, and electrical responses. The purpose of the course is to discuss the RPE/photoreceptor complex in terms of structure and function and particularly related to the transport of constituents associated with photo-transduction.

• 2644

Retinal glial cells

OSBORNE N

Oxford University, Nuffield Laboratory of Ophthalmology, Oxford, United Kingdom

The retina is populated by, in addition to neurons, three types of glial cell: Müller cells, astrocytes, and microglia. All cell-types within the retina communicate with each other as well as being closely associated with the retinal vasculature. Müller cells are uniquely present in vertebrate retinas principally supporting neuronal functions (by increasing the signal-to-noise ratio of information processing) and survival (by maintaining a metabolic 'symbiosis' with the neurons) in different ways. They also have the ability to uniquely guide light towards the photoreceptors and are capable of 'sensing' neuronal activity as well as responding to physiological light stimulation by adjacent photoreceptors with two distinct types of intracellular calcium rises. It is now clear that retinal glia contribute significantly to the structural and functional integrity of the retina but also play important roles in various retinopathies that include age-related macular degeneration, retinitis pigmentosa, retinal degeneration, glaucoma, and diabetic retinopathy. It is anticipated that as we gather an even deeper understanding of retinal glia function and dysfunction unique therapies will evolve to treat specific retinal pathologies.

• 2645

The ON/OFF system pathway of the retina

CASTELO-BRANCO M
Institute for Biomedical Imaging and Life Sciences IBILI and Institute for Nuc, University of Coimbra, Coimbra, Portugal

The ON/OFF pathways in the retina represent parallel systems with asymmetric properties. Here we discuss the basic anatomy and function of these pathways in health and disease, from the point of view of luminance, contrast and motion perception. We will also highlight how receptive field properties are shaped within each of these pathways and how they cross-talk within other parallel streams in the retina. Finally, we will address experimental and disease models that dissect the function of each of these pathways.

• 2651

Clinical evaluation in orbital tumors

MOURIALIX F
CHU PontChaillou, Service d'ophtalmologie, Rennes, France

The ocular examination should include the best-corrected visual acuity and intraocular pressure. A neuro-ophthalmologic examination, including motor and sensory functions, pupillary examination should also be done. During biomicroscopy, the integrity of the corneal and conjunctiva should be checked. Fully dilated indirect ophthalmoscopy should be performed because many orbital diseases cause a wide variety of fundunscopic changes. The major fundal manifestations of a space-occupying mass in the orbit include retinal folds, retinal vascular changes and optic disk edema and/or atrophy

The external examination of the patient should assess the facial features and critically evaluate the symmetry of ocular, eyelid, and orbital structures. Physical examination of the periorbital structures should include inspection of appearance and function, which are commonly altered by a space-occupying lesion in the orbit. The most important structural feature to rate in the examination of an orbit is proptosis, which is also known as exophthalmos, protrusion, or the displacement of the globe beyond the orbital rim. The position of the visual axis in a proptotic eye may provide useful information.

• 2652

The art of orbital imaging

TUNC M
Ankara Numune Training Hospital, Dept. of Ophthalmology- Ocular Oncology, Ankara, Turkey

The Art of Orbital Imaging in Management of Orbital Tumors:
Orbital imaging is the most important aspect of clinical evaluation in management of challanging cases of orbital tumors. We aim to discuss the key points of imaging studies in clinical evaluation and staging of patients with orbital tumors.
Orbital space is a complex anatomical structure that has close proximity to brain and paranasal sinuses. Various tumours and tumour-like conditions may arise in orbit, both in adults and children. Orbital imaging is critical for detection, characterization, location, differentiation and treatment planning of these orbital lesions. Interpretation of imaging studies are also prominent for correct clinical staging of certain orbital tumors, such as adenoid cystic carcinoma of the lacrimal gland.
In this section of the course, we will discuss, which imaging techniqe (CT, MRI, MRA, Diifusion weighted imaging etc) should be preferred in differential diagnosis, treatment planning and follow up of orbital tumors to achieve the most useful information. Furthermore, the imaging characteristics of common orbital tumors will be emphasized and discussed in depth in the context of this course.

• 2653

Orbital pathology: Differential diagnostic challenges

HEEGAARD S
University of Copenhagen, Department of Ophthalmology and Pathology- Rigshospitalet, Copenhagen, Denmark

Purpose: To present the most important and frequent orbital tumors that the clinician will encounter.
Material: Both the clinical data as well as the pathological description will be described in detail. Especially differential diagnostic challenging cases will be presented.
Results: Clinical pearls on how to differentiate the different orbital tumors will be given.
Conclusion: The correlation between clinical features and the pathological characteristics is presented in this lecture.

• 2654

Surgical management in orbital tumors

BRISCOE D
Emek Medical Center, Ophthalmology, Afula, Israel

Surgical management of orbital tumors is based on several basic principles. A thorough clinical history and examination should be made before viewing imaging. The location of the mass with regard to the optic nerve and the involvement of the extraconal or intraconal space are factors which will determine the surgical approach taken. In addition a tumor involving the surgical apex of the orbit should be carefully considered before operation.
The use of small minimal incisions give better results and less morbidity, and should be used where possible. Video presentations of approaches and pictures of numerous cases are presented.

• 2661

Genetics in microphthalmia

CALVAS P (1), Davis E (2), Ragge N (3), Fares-Taïe L (4), Srour M (5), Michaud J (5), Kaplan J (4), Rozet J M (4), Chassaing N (1)
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(3) Oxford Brookes University & Birmingham Women's Hospital, Dept of Biological and Medical Sciences & Clinical Genetics Unit- West Midlands Regional Genetics Service-, Oxford & Birmhingam, United Kingdom
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Congenital malformations of the eye comprise a wide spectrum of developmental defects. Anophthalmia-microphthalmia (AM) is the most severe end of these conditions. The different ocular malformations are thought to be part of an overlapping spectrum of embryonic developmental defects. Phenotypic overlap is emphasized by molecular results demonstrating that the same genes may lead to variable defects. We aimed at delineating the molecular bases of AM in order to improve knowledge on eye development as well as patient care. We follow one of the largest cohort of ocular developmental defects cases with extensive clinical and genetic analyses and report here extensive genetics analysis delineating a valuable genetic epidemiology of AM triggering genes. To date a genetic cause is identified in less than half of the patients suffering AM. The most likely explanation for this is that only a small proportion of causative genes have been identified. That is, we report here the strategy used to identify novel AM genes among rare and mainly sporadic patients. This led highlighting the malformation spectrum of already known genes and delineating original pathways respectively involved in retinoic acid metabolism and Sonic Hedgehog signalling.

• 2662

Nanophthalmos clinical features and specific outcome

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Hôpital Universitaire Necker Enfants Malades, Pediatric Ophthalmology, Paris, France

Nanophthalmos is a rare genetic eye disease. Anterior and posterior segment of the eyeball are significantly reduced without major structural anomaly. Otherwise than in microphthalmia, the eye is functional, visually functional with an extreme farsightedness or hyperopia. The high hyperopia is usually the first sign detected. In nanophthalmos, ultrasound shows markedly reduced axial lengths. They also present thickening of scleral tissues with fibronectin level. Although they may suffer problems associated with the extreme small size. An increased risk of glaucoma especially by closure angle may be observed. Uveal effusion represents the major complication and ocular surgery should be avoided as far as possible. Complications may lead to amblyopic vision loss. These seem secondary to the actual disease state, which may be viewed as one extreme on the spectrum of refractive errors. Nanophthalmic patients in infancy present a relatively good visual acuity but the pathology may lead to severe visual impairment.

• 2663

Optical coherence tomography findings of retinal folds in nanophthalmos

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Nanophthalmos is a rare form of congenital microphthalmos and it can be seen in siblings due to genetic transmission. The eye is small in overall dimensions including short axial length (16-18.5 mm) with shallow anterior chamber and almost normal lens size. Typically high hyperopia is seen. Posterior findings include; cupless and crowded optic disc, and elevated papillomacular retinal folds. Optic Coherence Tomography (OCT) can reveal retinal fold with normal retinal pigment epithelium and choriocapillaris. It is presumed that the retinal folds in nanophthalmos result from a redundancy of the retinal layer caused by retarded growth of the scleral, choroidal,and retinal pigment epithelial layers and OCT can demonstrate papillomacular retinal folds that are confined to the neurosensory retina.

• 2664

Specific gene in microphthalmia

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Anophthalmia and microphthalmia (A/M) are early-eye-development anomalies resulting in absent or small ocular globes, respectively. Genetically determined A/M are characterized by major genetic heterogeneity. In addition, there is a genetic overlap with some genes being involved in both anophthalmia and microphthalmia. Recently, we reported that mutations in the gene encoding the A3 isoform of the aldehyde dehydrogenase 1 (ALDH1A3) cause A/M with occasional orbital cystic, neurological, and cardiac anomalies in three consanguineous families. ALDH1A3 is a key enzyme in the formation of a retinoic acid (RA) gradient along the dorso-ventral axis during early eye development. Although the role of (RA) signaling in eye development is well established, these findings provided genetic evidence of a direct link between RA-synthesis dysfunction and early-eye-development anomalies. Since the original report, A/M has been ascribed to homozygous ***ALDH1A3*** mutations in sixteen additional consanguineous families describing variable clinical expression, within and between families, ranging from silent expression to multisystemic diseases. The variable expression of ***ALDH1A3*** mutations which are a leading cause of A/M will be discussed.

• 2671

Effectiveness of platelet-rich plasma treatment in patients with chronic corneal erosions, associated with Herpetic keratitis

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Purpose 3 courses of platelet-rich plasma (PRP) instillations were investigated for their effect on corneal epithelialization, in cases, associated with Herpetic keratitis
Methods The study involved 21 patients with chronical corneal erosions of Herpetic keratitis origin. Etiology was confirmed by immunosorbent immunoglobulins M, G assay for Herpes Simplex Virus 1,2, Cytomegalovirus and Virus Epstein - Barrie. All patients had previous unsuccessful courses of reparative therapy. First step of treatment consist of local and systemic antiviral therapy (Gancyclovir eye gel 0,15% and Valcyclovir). After the antiviral therapy, common volume 15ml. of blood, taken from patients cubital vein, was mixed with anticoagulant (Sodium citrate with Dextrosa), and undergone a double centrifugation for 4 min. at 3500 rpm. Patients were receiving: PRP instillations 6 times a day in combination with subconjunctival injection ones a week, Sulfated glicosaminoglicans 0,01% 4 times a day, Dexpanthenol 5% 4 times a day. Course of treatment was 3 weeks, procedure of obtaining PRP was performed 1 time per week. Dynamic of the treatment was assessed by Efron scale (cornea fluorescein coloring at 5 sectors in points). The patient's condition before therapy was used as a control.
Results The average index of the corneal lesion before treatment was 9.7 points. After the 1st and 2nd procedure average lesion index was 8.2 and 5.9 points respectively. After 3 weeks, complete epithelization was observed in 12 patients. In 6 patients a gradual disappearance of the epithelial defects was shown after 5-6 courses. 3 patients did not respond to the treatment.
Conclusions PRP treatment showed positive dynamic in cases of previously unsuccessfully treated chronical corneal erosion.

• 2672

Ocular surface involvement on GVHD patients

LAZREG S
Cabinet Lazreg, cabinet lazreg, Algiers, Algeria

Purpose To identify the different complications of GVHD on ocular surface
Methods Ocular examen de surface sur les patients atteints de GVHD, visé par le centre de l'os greffe de moelle d'Alger, tous bénéficié de OSDI Questionnaire, fente examen à la lampe, la coloration fluorescéine et test de Schirmer,
Results 31 patients were assessed, 22 males , tha mean age value were 39,3 years+/_ 7,4; all patients presented different levels of severity of dry eye at slit lamp examination, 5% of them had a very low visual acuity; Mean OSDI score was 76,4+/_10,2 corneal staining was present on 92% of cases (oxford : 6,5+/_ 2,5) and Schirmer value 10+/_5,4),
Conclusions Dry eye is the most common ocular complication on GVHD patients, in most of cases it is a severe dry eye with corneal involvement and visual impairment, an early diagnosis and treatment of ocular manifestations of GVHD is essential to prevent severe complications.

• 2673

Communication between the researcher and the researched. Designing an application based study regarding effects of air pollution on ocular surface diseases

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Purpose To inform application users about current air pollution and their ocular surface state. To gather data concerning correlation between air pollution and ocular surface diseases.
Methods AirPoll is a mobile application that serves as a gateway to a nation-wide air pollution study. We designed it using Apple's Research Kit - an open source software framework for medical researchers. After all the permissions are granted and consent form is signed digitally, the application uses phone's Global Positioning System to determine user's location and then connects to the server of US Environmental Protection Agency to determine the level of various air pollutants. The built in questionnaire module allows us to gather data related to user's health, including past medical history and OSDI Dry Eye questionnaire. To raise user's engagement in the study and provide an information feedback, every user has access to his or her data presented in an easy to understand manner. Both current pollutants in the user's location and his approximate health state are displayed in a simple graph form.
Results Data concerning current air pollutants levels basing on geolocation of the application user (including particulate matter with a mean aerodynamic diameter of 2,5µm and 10µm, ozone, sulfur oxides and volatile organic compounds) and results concerning ocular surface obtained using OSDI Dry Eye questionnaire.
Conclusions This innovative approach to sharing information in medical research not only raises user's involvement in the study, but also fulfils an educational purpose.

• 2674

Correlations Fleischer deposits with topographic parameters at different deformations of the cornea

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Purpose Assessment of topographic and tensor topographic maps of the patients and the analysis of their compliance with deposits Fleischer.
Methods 28 patients with disorders of the biomechanics of cornea after RK, PRK, TKC, LASIK, IOL implantation, as well as using the orto-contact lenses and degenerative changes various stages of keratoconus. All patients complemented by photos recording Fleischer corneatopography deposits and then calculating stress distribution map of the cornea -keratotenzotopogramm(KTT).
Results The correlation position Fleischer deposits with zones of maximum mechanical stress gradient in corneas with disabilities form as a result of various causes. Most obviously there Fleischer pigment deposits in the form of rings - after hyperopic LASIK. Position of Fleischer ring correlated with the area of corneal mechanical stress maximum gradient according keratotenzotopogramm
Conclusions We are inclined to the hypothesis that Fleischer deposits are natural markers of corneal zone, which are activated in the past or have been active processes caused by excessive mechanical stress in the cornea's stroma.

• 2675

Severe ocular manifestations of rosacea in adult

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Purpose Ocular rosacea in adult is a rare condition that may be responsible for palpebral, cunjonctival and corneal complications with severe visual functional prognosis in some cases. The purpose of this study is to determine the nature and prognosis of corneal complications in this disease through our study and literature review
Methods We report seven patients (14 eyes) with severe ocular rosacea requiring hospitalization
Results The mean age of our patients was 59.6 years. Six patients (85.6%) were female. Visual acuity was <1/10 in 10 eyes. The complications were keratitis in 7 eyes, corneal ulcerations in 5 eyes, corneal perforation in 5 eyes, and catarrhal infiltrates in 6 eyes. Limbal neovascularization was noted in 11 eyes. Only one patient has ocular-cutaneous form. All patients were treated with oral cycline, topical steroids in acute phase, artificial tears and eyelid hygiene. A bandage contact lens was applied to 4 eyes. Three eyes required penetrating keratoplasty. They were successfully treated with improvement of symptoms and cicatrisation of corneal lesions. One case of corneal graft failed secondary to infectious keratitis.
Conclusions The diagnosis of ocular rosacea is difficult because it often occurs without skin involvement. Ocular rosacea is the only complication of cutaneous rosacea. Diagnosis should be as early as possible because ocular complications are possible, with blinding potential. The best treatment is prevention with regular eyelid hygiene.

• 2676

Pollen Count Compared with Severity of Symptoms and Signs of Dry Eye Disease in Norway

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Purpose To investigate whether pollen counts are associated with severity of symptoms and signs of dry eye disease (DED) in Oslo, Norway.
Methods The mean daily number of birch or grass pollen grains per cubic meter of air (pollen count) in Oslo from 2012 to 2015 between March and September were provided by The Norwegian University of Science and Technology and The Norwegian Asthma- and Allergy Association. Four hundred and twelve DED patients that were examined for the first time on the same day as pollen data were available were included. Symptoms of DED were measured by the Ocular Surface Disease Index (OSDI) self-report questionnaire and signs of DED included measurements of tear osmolarity, tear film break-up time, blink interval, ocular protection index, Schirmer I, staining, meibum expressibility and meibum quality from the right eye. Symptoms and signs, as well as the composite score for dry eye severity level (DESL), were compared with pollen count using Pearson's and Spearman's correlations, Chi square test and Mann-Whitney U-test.
Results Birch pollen was generally only detectable during April and May, whereas grass pollen was normally detectable during June. Neither birch (rs=-0.13; P=0.81) nor grass (rs=0.06; P=0.38) pollen were associated with symptoms of DED as measured by the OSDI. Except Schemer I test, which surprisingly was negatively related to grass pollen count (rs=-0.15; P=0.02), neither pollen types correlated with DESL or any signs of DED. Only 5.6% of the patients reported the use of systemic prescription drugs against allergy, thus the weak association between pollen counts and severity of DED appear not to have been confounded by concomitant use of anti-allergy medications.
Conclusions The severity of symptoms and signs of DED in Oslo, Norway does not seem to be strongly associated with either birch or grass pollen count.

• 2677

Surface chemistry of the interactions of cationic nanoemulsions with human meibum films

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(3) Santen SAS, Novagali Innovation Center, Evry, France

Purpose Ikervis® (IKV) cationic nanoemulsions (CNE) were demonstrated to enhance tear film stability in vivo possibly via effect on tear film lipid layer (TFLL). Therefore the interactions of IKV and of binary and ternary mixtures of its constituents were studied with human meibum (MGS) films. The binary mixtures consisted of 2% mid chain triglycerides (MCT) blended with 0.005% cetalkonium chloride (CKC) and 0.3% Tyloxapol (e.g. MCT/CKC and MCT/Tylo respectively). The ternary mixture contained MCT/CKC/Tylo (2%/0.005%/0.3%). The impact of 0.1µM bovine submaxillary mucin (BSM) on CNE/MGS interactions was also evaluated.
Methods MGS and CNE oils were spread at the air/water interface of a Langmuir surface balance in range of 2D ratios (20/1, 10/1, 5/1, 3/1, 2/1 and 1/1) at two measurement regimes: with (i) MGS or (ii) total lipid amount kept constant. The films capability to reorganize during dynamic area cycling was evaluated. The layers dilatational rheology was probed via the step/relaxation method. Films structure was monitored with Brewster Angle microscopy.
Results The binary mixtures showed limited spreading and miscibility with MGS resulting in poor mechanical properties. The ternary mixture and IKV spread and mixed well with MGS. At fixed MGS amount, the inclusion of CNEs enhanced the structure, properties and elasticity of the layers. At fixed total lipid, the films remained primarily elastic, but at high (≤3/1) CNE content the elasticity slightly decreased and heterogeneities in layers structure were observed. BSM enhanced the ternary mixture (IKV)/ MGS interactions.
Conclusions At physiologically relevant MGS/CNE ratios MCT/CKC/Tylo and IKV interact favorably with MGS films. The positive effect of BSM suggests that polyanionic polysaccharides can enhance CNE/TFLL interactions in vivo.
Support: Collaborative study grant by Santen SAS, Evry, France.

Conflict of interest
Any post or position you hold or held paid or unpaid?:
Santen SAS employee

• 2681

Normal values for fundus perimetry with the MAIA microperimeter and short-term repeatability evaluation

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Purpose To assess retinal sensitivity by means of microperimetry and to evaluate the intersession fluctuation using the MAIA microperimeter in healthy volunteers.
Methods Prospective, monocentre study. Fifty-six healthy volunteers (age range, 20-80 years), underwent an automatic, full-threshold microperimetry of the central field (custom grid, area of 10° in diameter, 37 stimulated points), with the MAIA microperimeter (CenterVue, Padova, Italy). A subgroup of 24 subjects was retested after 1 hour (test 2) and 1 week (test 3) to determine the repeatability of the technique. A subgroup of 22 subjects was also tested on the OPKO microperimeter (Optos, Dunfermline, Scotland) (area of 10° in diameter, 28 stimulated points).
Results Median age was 30 years [25.3-47.8]. The overall mean sensitivity for test 1 was 29.4 ± 1.4 dB, 29.8 ± 1.0 dB for test 2 and 29.9 ± 1.1 dB for test 3, respectively. Linear regression analysis showed a significant 0.5 dB sensitivity loss for each decade of life (r^2 = 0.27). In a subset of 24 subjects, the repeatability of the test performed at 3 separate visits showed a statistically significant difference between test 1 and 3 ($p < 0.004$). Test 2 and 3 showed consistent values over time ($p = 0.160$). Furthermore, the MAIA showed higher threshold values than the OPKO for all test locations. Linear regression of the perimetric results showed significant correlation between the 2 machines ($r = 0.44$; $p < 0.001$).
Conclusions This study found an age-related macular sensitivity loss. These findings are in agreement with previous data obtained with the MP1 and the OPKO microperimeters. The increase in sensitivity between test 1 and test 2 and 3 should be taken into account in clinical practice. Automatic fundus perimetry with the MAIA microperimeter allows for accurate, repeatable examination, if a training session is performed.

• 2682

High resolution adaptive optics retinal image analysis in early-stage central areolar choroidal dystrophy with a PRPH2 mutation

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Purpose To report clinical features in Japanese patients with early stage (stage 1 and 2) central areolar choroidal dystrophy (CACD).
Methods Five family members participated in this study. We performed comprehensive ophthalmic examination, including adaptive optics (AO) retinal imaging. Mutation analysis of the ***PRPH2*** gene was performed by Sanger sequencing. The protocol of this study conformed to the tenets of the Declaration of Helsinki and was approved by the Institutional Review Board of The Jikei University School of Medicine.
Results Four family members possessed a heterozygous ***PRPH2*** mutation (p.R172Q), however, a member with a mutation did not show any ophthalmological abnormality. Two patients showed mild parafoveal retinal dystrophy and reduction of cone density revealed by AO analysis.
Conclusions We described a CACD family with marked intrafamilial phenotypic variations. Our results indicate that parafoveal cone photoreceptors are affected primarily at the early-stage CACD.

• 2683

Static and dynamic retinal vessel analyses in patients with stroke as compared to healthy control subjects

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Purpose The retinal microcirculatory bed shares anatomical and physiological characteristics with the cerebral circulation. Static and dynamic changes in the retinal blood vessels can mirror cardio- and cerebrovascular events. The aim of the study was to underpin the relevance of retinal analysis for stroke research.
Methods 18 stroke patients and 16 age-matched healthy control subjects were included in the present study. Retinal image acquisition was done with a Zeiss fundus camera FF 450plus. Static vessel analysis was done using IFLEXIS software provided by VITO (www.iflexis.com). Retinal vessel dimensions and geometric dimensions were determined. A retinal arteriole and a retinal venule were examined before and after flicker light stimulation for 60 seconds. Flicker response, the relative change of vessel diameter due to flicker light stimulation, was calculated using Dynamic Vessel Analysis by imedos (www.imedos.de).
Results Central Retinal Arterial Equivalent (CRAE) was significant smaller in stroke patients when compared to the control group, whereas Central Retinal Venular Equivalent (CRVE) was comparable between the groups. Arteriovenous ratio (AVR) was significantly smaller in the stroke group. The analysis further showed significantly smaller daughter arteriolar branches and larger venular branch angles in stroke patients. Dynamic vessel analysis found reduced arteriolar diameters in stroke patients. Response to flicker light was smaller in stroke patients but this difference did not reach level of significance.
Conclusions Our pilot study indicates that retinal analysis is a non-invasive and convenient tool that is relevant to study microvascular changes in stroke patients The importance of retinal changes as a risk factor for stroke or for patient stratification is now being addressed in follow-up studies.

Conflict of interest
Any post or position you hold or held paid or unpaid?:
VITO (www.vito.be) is a research organization of the Flemish Government. The Health unit is performing research and development in the field of retinal vessel analysis. In this context, the team is developing IFLEXiS analysis software for microvascular analysis. Besides research, the aim is to explore to what extent research groups are interested in using (and buying) the software.

• 2684

Stereo OCT angiography in macular diseases

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(3)Fondation Rothschild, Ophtalmologie, PARIS, France

Purpose To present stereo optical coherence tomography angiography (SD OCT-A) images of patients with different macular pathologies.
Methods A series of patients with macular pathologies underwent OCT-A imaging with the Heidelberg Engineering SPECTRALIS OCT2 device. In addition, these patients underwent OCT B and C scans, color fundus photographies and fluorescein and ICG angiographies. The OCT-A images were then computerized in a manner to give stereo images. Slabs of different thicknesses were analyzed and are presented.
Results Thirty seven eyes with different macular diseases (10 exsudative AMD, 16 diabetic retinopathies, 10 retinal venous occlusions, 1 acute macular placoid pigmented epitheliopathy) were included and analyzed.
Stereo OCT-A allowed to show the vascular abnormality and its impact on the retina and the choroid. The swelling of the retina was highlighted in stereo viewing.
Conclusions Stereo OCT-A is a new additive technique to OCT imaging. It gives a global assessment of the central retina pathology highlighting retinal swelling.
This technique needs perfect segmentation to achieve good stereo images and improvements are currently needed.

• 2685
Hypoxia and retinal blood flow changes: a study using OCT-Angiography

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Purpose The raising number of commercial flights means a routinely exposure to hypoxic conditions by the crew and passengers. Aircrafts' cabins are pressurized to a value of 565mmHg, equivalent to breathing 15,1% oxygen at sea level. We aimed to study the relationship between normobaric hypoxia and retinal blood flow.
Methods Prospective cohort study. The Hypoxia Challenge Test was performed at sea level, according to the British Thoracic Society protocol. OCT-Angiography (AngioVue®) was done at three time-points (baseline, hypoxia and 30' post-hypoxia). Foveal and parafoveal flow densities were assessed using built-in AngioAnalytics®. To guarantee data independence, right and left eyes were compared separately. Only images with high-quality acquisition signal were included. Repeated-measures ANOVA and mean comparison analysis were performed using STATA 13.0.
Results Studied population included 30 subjects (14 women), with a mean age of 28.8 ± 4.2 [range 22-37] years. There was no statistically significant within-subject difference in foveal flow density in both right and left eyes. However, within-subject differences in parafoveal flow density were recognized for both right ($p = 0.05$) and left eyes ($p = 0.03$). Paired analysis confirmed a significant difference ($p < 0.05$) in mean parafoveal flow density between the three time-points: baseline (OD = 55.7 ± 0.46, OS = 57.1 ± 0.44), hypoxia (OD = 56.7 ± 0.38; OS = 57.9 ± 0.35) and post-hypoxia (OD = 56.1 ± 0.35, OS = 57.0 ± 0.39).
Conclusions To our knowledge, there is no published data specifically addressing flight cabin hypoxia and eye hemodynamics. Our work in healthy subjects may help to establish normality thresholds and identify individuals at risk and their need for personalized screening and therapeutic air-travel recommendations.

• 2686
Static retinal vessel analysis in routine optometric practice

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Purpose To evaluate the use of objective retinal vessel calibre measurements in optometric practice and its utility in clinical decision making.
Methods A sub-sample [n=56] was extracted from a prospective study including patients booked for routine eye examinations in optometric practice. All participants underwent a standard examination including subjective refraction and slit lamp biomicroscopy. Undilated fundus photography and/or optical coherence tomography (OCT) was also performed. Optic nerve-centred (camera angle: 50 degrees), red-free photographs were analysed using VesselMap software (Imedos, Germany) to give objective vessel calibre measurements (central retinal artery and vein equivalents (CRAE / CRVE)).
Results Mean age of the cohort was 56 years (range: 21-82yrs; consisting of 32 women and 24 men). Univariate analysis showed a significant association between systolic blood pressure and CRAE which was lost in multivariate analysis ($p=0.02$). Stepwise forward multiple regression analysis found age to be significantly, negatively associated with CRAE (CRAE: 157au (SD ±20); $\beta=-0.54$; $p<0.001$) and CRVE ($\beta=-0.56$; $p<0.001$), whereas BMI was positively associated with CRVE (198au (SD ±20) au; $\beta=1.84$; $p=0.005$) only. Two patients were measured twice: on initial presentation, one with a significant retinal haemorrhage and one with unilateral papilloedema; both showed normalisation of vessel diameters on follow up.
Conclusions Participants with the largest CRVE had the highest BMI and/or were diabetic. Cross-sectional results from this sample are in agreement with results published from large cohort studies, including the negative association with age and CRAE. Retinal vessel calibres can help provide information on a patient's vascular system and systemic health, and therefore be a useful tool to refine optometric referrals and aid patient monitoring.

• 2687
Trial study to automatically distinguish small haemorrhages in early diabetic retinopathy from image artefacts

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Purpose The L*u*v* colour space presented optimal results, with the highest sensitivity and best reproducibility, among RGB, XYZ, CMY, HSL, HSV, HSI and L*a*b* colour spaces. Therefore, we employed three-dimensional analysis of L*u*v* colour spaces to detect early diabetic retinopathy.
Methods Six patients with small haemorrhages were evaluated using fundus photography, which revealed image artefacts in the fundi of some patients. We constructed an experimental device similar to the optical system of a fundus camera and created artificial eyes of the fundus, which were painted with five different colours: rose, coffee, red, orange and yellow. The image artefacts were photographed under each artificial eye using the experimental device. In addition, the following eight types of specimen were used: a dust particle, wool, a piece of paper, a wood chip, cotton, a grey hair, a drop of water and a piece of plastic bag. All images were analysed using Scilab 5.4.0 and SIVP 0.5.3 softwares.
Results We constructed an algorithm to calculate the difference between the averages of the central and circumference areas. In all image artefacts, L*u*v* colour spaces was highly sensitive: L* values were 2.8–8.5, u* values were 3.8–21 and v* values were 4.2–10.1.
Conclusions We succeeded in automatically distinguishing small haemorrhages in early diabetic retinopathy from image artefacts.

• 2711
Vitrectomy for vitreous floaters

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Symptomatic vitreous "floaters" are one of the most common presenting complaints in the clinics of ophthalmologists. Although most patients will accept observation as the symptoms often improve spontaneously, in a subset of patients the symptomatic, persistent vitreous opacifications do not disappear with time and may become highly bothersome in daily life. During the past two decades, more and more patients have been treated for persistent floaters. Pars plana vitrectomy (PPV) and Nd:YAG laser photodisruption have been considered. Since Robert Machemer introduced PPV in the early 1970s, and with the progressively decreasing gauge size, the idea of using this surgical technique for vitreous opacities has become a hot topic in the ophthalmologic community. PPV is the gold standard for mechanical removal of vitreous opacities. The so called 'floaterectomy' shows resolution of vitreous opacities in over 95% of cases and patient satisfaction rates range from 85%–94%, with improvement in contrast sensitivity and quality of life. Microincisional vitrectomy surgery (MIVS) has been shown to decrease operative times, surgically induced trauma and postoperative inflammation, leading to a more rapid recovery and in a more safety manner.

• 2712
Laser for vitreous floaters

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Background: The presence of a space between the posterior capsule and the anterior vitreous was first proposed in 1887 but difficulties inherent in examining this structure had made it impossible to visualize this area in vivo until now. Estimation of the size of this space was considered as impossible.
Materials and methods: We utilize an optical coherence tomography system attached to the Zeiss Opmi Lumera 700/Rescan microscope (Zeiss Ltd, Germany) to provide real-time images of the Berger space, the anterior hyaloid and the ligament of Wieger.
Results: The results of three patients show beautiful real-time OCT images of the Berger space and of the ligament of Wieger. In one high myopic eye there was even evidence of anterior vitreous detachment (AVD).
Conclusion: Previously unseen transparent structures of the eye can now be imaged intraoperatively using real-time OCT.
This technique provides information on the status of the posterior capsule but more interestingly from the anterior hyaloid and its posterior capsule attachment by the ligament of Wieger. These previously unseen changes in the anterior hyaloid may contribute to the better understanding of the posterior segment complications after cataract surgery.

Conflict of interest
Any consultancy arrangements or agreements:
Patent holder for the bag-in-the-lens (licensed to Morcher GmbH)
Consultancy Théa Pharma
Consultancy Zeiss

• 2713
Antibiotics in intravitreal injections

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Endophthalmitis following intravitreal injection is uncommon. It was shown in several retrospective studies that pre-injection and post-injection antibiotic treatment was not supported by sufficient evidence of efficacy, and may in fact increase the rate of endophthalmitis. It is of increasing awareness that antibiotic use causes antibiotic resistance and that globally antibiotics are overused in different fields of medicine, including ophthalmology. This may lead to loss of activity of major antibiotics and inability to use them in future, increase in multidrug resistance, increase in infections caused by antibiotic-resistant bacteria, and increase in health-care costs. It was shown in several studies that repeated use of topical antibiotics lead to increase of antibiotic resistance in conjunctival flora and the use of antibiotics might be related with increased risk of endophthalmitis caused by resistant bacteria. Concluding, antiseptics (specifically povidone-iodine), rather than antibiotics, are preferred for the majority of patients undergoing intravitreal injections.

• 2714
Treat & Extend vs PRN in AMD

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Basically 3 different approaches to anti-VEGF treatment in AMD are in clinical use, a fixed regimen using monthly or bi-monthly injections (IVI), a PRN strategy and a Treat and Extend (T&E) regimen.
T&E is a proactive and individualized anti-VEGF treatment regimen. Basically IVI are performed monthly until stability is achieved. When disease activity is stable or the retina is dry the interval for the next IVI and control visit is extended by 1 or 2 weeks. The maximum tolerated interval usually is 12 weeks during the first 2 years of treatment. If activity reoccurs the interval is shortened by 1 to 4 weeks. In consequence this means each visit includes a diagnostic examination and an IVI, independently of the status of disease activity.
Evidence for T&E is limited as there are no randomized controlled studies available. However it is frequently used in clinical routine. Results from extensive case series in the literature demonstrate better functional outcome compared to PRN, less visits compared to PRN and fixed strategies and a mean number of about 6 to 8 injections during the first year of treatment.

• 2715

Treat and Extend vs PRN in Diabetic retinopathy

POURNARAS C

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Vascular endothelial growth factor (VEGF) plays a key role in the pathogenesis of the neo-vascular age related macular degeneration (nAMD) and the ischemic retinal microangiopathies. Targeting VEGF in retinal diseases became an effective therapeutic option.

To optimize the benefit of risk ratio and cost effectiveness of anti-VEGF agents, a number of flexible dosing strategies have being used in clinical practice.

The treat and extend regiment (TE) is defined as an individualized proactive dosing regimen usually initiated by monthly injections until a maximal clinical response is observed, followed by increasing intervals between injections (and evaluations) depending on the disease activity. It appears as an effective approach to tailoring the dosing regimen and for reducing treatment visits and injections, compared with fixed monthly dosing or monthly visits with optical coherence tomography (PRN).

The individualised anti- VEGF TE regimen can improve and stabilise patient outcomes in diabetic macular oedema and nAMD. The potential to reduce healthcare resource burden incurred from fixed monitoring requirements, will be of benefit to health care, in the management of retinal diseases.

• 2721

Laser Trabeculoplasty Is the glaucoma fraternity completely convinced?

GAZZARD G
Moorfields, London, United Kingdom

Laser Trabeculoplasty: drop-free nirvana or false-hope?
Evolution of laser trabeculoplasty continues, as does debate about its place in the glaucoma treatment hierarchy.
Evidence of clinical effectiveness, patient choice, cost-effectiveness and impact on health-related quality of life guide treatment choices: I shall review the latest developments in the science of laser treatments to the trabecular meshwork.

Conflict of interest
Any research or educational support conditional or unconditional provided to you or your department in the past or present:
Our department received a research grant to support trial protocol development from Lumenis.
I have received unrestricted research grants from Lumenis and funding for an educational programme from Allergan.

• 2722

Inside out Diode laser for rubeotic glaucoma in the anti VEGF era

AHMED F
Western Eye Hospital Imperial College Healthcare NHS Trust, Glaucoma, London, United Kingdom

Modern management for recalcitrant rubeotic glaucoma involves a multi-step process involving intra-vitreal anti- VEGF injection , out patient pan retinal photocoagulation and glaucoma drainage device surgery implant in theatre.
We re-visit the use of a 2 step pathway with intra-vitreal anti-VEGF injection followed by combined ciliary body ablation and pan-retinal photocoagulation using a transcleral diode laser. This out of vogue treatment can performed in an out patient setting under local anaesthetic and is an effective method of treating rubeotic glaucoma and may also be more cost- effective. In addition the role of Micro-pulse Diode laser will be also reviewed.

• 2723

Yag laser glaucoma treatments; iridotomies and beyond

CRAWLEY L
Imperial College Healthcare NHS Trust, London, United Kingdom

YAG lasers have a multitude of uses in the glaucoma patient beyond capsulotomy and iridotomy. In this session we will discuss how YAG can optimize Tube flow, its role in managing misdirection and how and when to use it in manipulating iris tissue in compromised drainage angles.

• 2724

Endoscopic laser- a direct view on the direct view

BLOOM P
Western Eye Hospital, London, United Kingdom

With the current direction of travel towards Minimally Invasive Glaucoma Surgery (MIGS), Endoscopic laser Cycle-Photocoagulation (ECP) is enjoying a resurgence in popularity. Is this justified given examination of issues of safety and efficacy? Is there still a place for trans-scleral CP? This presentation will answer these questions and more, in a practical yet evidence-based manner.

Conflict of interest
Any Lecture fee paid or payable to you or your department:
Past lecture fees

• 2731

Presentation skills for oral presentations

JOHANNESSON G
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An important part of being a scientist is communicating findings and results to fellow colleagues and the public. This is often achieved through oral presentation in front of a group of people. How well the message is conveyed to the crowd depends largely on the presentation skills of the oral presenter. Yet many scientists do not get adequate education or training in presentation skills and techniques. Consequently many presenters are forced to learning by doing. This short talk will highlight a selection of tips and tricks to improve the presentation skills for oral presentations.

Conflict of interest
Any consultancy arrangements or agreements:
Alcon, Allergan.
Any Lecture fee paid or payable to you or your department:
Allergan, Thea, Topcon, Alcon.

• 2732

How to fast track your research career

BECHRAKIS N E
Innsbruck Medical University, Ophthalmology, Innsbruck, Austria

What is your primary aim? Is it research, because you are intrinsically interested in finding and discovering new things, or is it a way of achieving better career opportunities? Why fast track? It is usually the persistence that prevails. Look for the tortoise and the hare. Which one are you?
Look for opportunities. Life has a much bigger phantasy than ourselves, and unexpected black swans are encountered often, so what really makes the difference is what you make out of your opportunities. Use them, you will get them. Be authentic and reliable. Your superiors, peers and subordinates need to count on you, this will make all the difference.
Try to grasp the trend. In order to do that, you need to know the current situation and possibly how it evolved towards the status quo. Next step is to challenge it.

• 2733

Tricks for the spotlight - handling media

SOMNER J
Anglia Ruskin University, Vision and Eye Research Unit, Cambridge, United Kingdom

A short guide to opportunities for getting your research out there. Taking in traditional outlets and more novel web 2.0 tools. Some simple dos and don'ts with examples.

• 2734

How to succeed with grant applications?

DANIELSON P
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To accomplish scientific breakthroughs, all researchers are dependent on funding to support their studies. Without funding, not even the best idea or the most thrilling hypothesis will ever be tested. In a climate of increasing competition for grants, the art of forcefully conveying the message of one's research in a proposal, and making the funders understand its importance, is becoming more and more crucial for any researcher. Not least clinician-scientists, having to confront competition for grants from full-time researchers that are not torn from their projects by 'distractions' like clinical work, face an ever increasing challenge in getting their research funded. This brief tutorial talk will share some insight in the art of writing grant proposals and highlight some tricks and tips for the first-time applicant as well as more experienced writers of grants.

• 2741

Topical cyclosporine-A in dry eye associated with chronic graft versus host disease

ATILLA H
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Graft-versus-host disease (GVHD) is a major complication of bone marrow transplantation and seen in 50-70% of cases. It is a complex clinical disease with many organ and system involvement. Acute form is seen in the first 3 months after transplantation, mainly as hepatitis and chronic form is mostly seen after acute GVHD. Ocular manifestations can be classifed as anterior and posterior findings but dry eye syndrome is the most frequent ocular finding and seen in 40-90% of patients with chronic GVHD. Corneal vascularization, keratitis and perforation can be seen. Topical cyclosporine-A might be an effective and safe treatment option in dry eye related to chronic GVHD in combination with topical steroids, autologous serum, lubricant eye drops and ointments.

• 2742

Severe clinical features in Vernal Keratoconjunctivitis

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Vernal keratoconjunctivitis (VKC) is a severe form of ocular allergy , that can causes severe visual complications, it is more frequent on warm climates. VKC occurs mainly in children , the incidence is higher in males by a ratio of 3 to1, and usually appears seasonally, from early spring untill automn. Clinically we can observe 3 forms, tarsal VKC, limbal and mixed forms, tarsal forms are the most common, with a giant papillae in the tarsal side of the conjunctiva, limbal forms may be oeudematous or nodular with trantas nods. Cornea is very frequently involved, and corneal lesions are various from punctuate keratitis to ulcers and in some cases to vernal plaques. Most of the patients presents an irregular astigmatism, and some of them keratoconus probably due to eye rubbing. The first step of the treatment is to identify the allergens by the allergologist, to avoid them or to begin desensitization. Medical treatment consists on topical steroids during acute phases, associate to topical mast cell stabilizers; for severe cases topical ciclosporine 2% is prefered to steroids, when it is available, if not, intratarsal injection of triamcinolone can help to improve corneal healing, vernal plaques must be removed surgically.

• 2743

Atopic Keratoconjunctivitis in children

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Abstract not provided

• 2744

Topical cyclosporine-A in Vernal Keratoconjunctivitis, when how and how long

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Vernal keratoconjunctivitis (VKC) is a severe ocular allergic disease occurring in children and adolescents. This chronic, allergic and inflammatory severe condition in children may result in visual impairment. Two forms of VKC may be observed, tarsal form and limbal form. Symptoms as itching, tearing, Topical antihistamine and mast cells stabilizers, as classical treatment, are regularly ineffective and topical steroids are required. However, steroids may be iatrogenic in this chronic condition. The anti-inflammatory effect of a topical cyclosporine allows topical steroids sparing. Different forms of ciclosporin will be detailed as oily preparation or cationic emulsion. Adjustment of the dosage and duration is essential to match the form. Risks of visual impairment justify to integrate topical cyclosporine treatment. Practical aspects of the treatment may provide better quality of life for children and parents.

• 2751

The role of anterior segment optical coherence tomography (AS-OCT) and ultrasound biomicroscopy (UBM) in conjunctival nevi

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Purpose To compare AS-OCT and UBM in the evaluation of conjunctival nevi.
Methods Prospective, observational, non-randomized trial. We examined 16 eyes of 15 consecutive patients with conjunctival nevi.
Results The visualization of the margins of the nevus was categorized as good, fair or poor. There was a good resolution in 100% of anterior margins for both UBM and AS-OCT cases. On UBM and AS-OCT the posterior margin had a good or fair resolution in 94% and 88%, respectively. Except for 1 UBM image, all AS-OCT and UBM images had a good or fair resolution of the lateral margins. Some degree of deep optical shadowing was seen on all AS-OCT images, but it only hindered good visualization of the posterior margin in 3 cases.
AS-OCT was able to visualize the nevi with a better resolution than UBM. Intrinsic cysts were seen in 6 cases (36%) with UBM and in 13 cases (81%) with AS-OCT, not necessarily in the same cases.
Conclusions AS-OCT and UBM have the ability to accurately visualize the anterior and posterior margins of conjunctival nevi although AS-OCT is more accurate in visualizing details. AS-OCT is also more patient friendly but it has the disadvantage of deep optical shadowing, especially in thick nevi. We would advise to document conjunctival nevi with photographs and AS-OCT first and to use UBM only when the nevus is too thick to visualize the posterior margin with AS-OCT.

• 2752

Loss of 5 hydroxymethylcytosine in conjunctival melanoma

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Purpose Recent studies suggest that conjunctival and cutaneaous melanoma partially share similar molecular features. In cutaneous melanoma, loss of 5 hydroxymethylcytosine (5-hmc) was identified in tumor progression and associated with a poorer survival. We decided to assess if similar epigenetic events occur in tumor progression of conjunctival melanoma and evaluated 5-hmc expression in benign and malignant conjunctival melanocytic proliferations.
Methods 5-hmc expression was evaluated by immunohistochemistry in 32 conjunctival naevi and 36 conjunctival melanomas from respectively 32 and 31 patients. Statistical analysis was performed with JUMP 8,0 software. Immunohistochemistry was assessed by three observers. Discrepant cases were simultaneously reviewed to achieve complete agreement.
Results 5-hmc was found in all the nevi.
There was a significant downregulation of 5-hmc in conjunctival melanoma compared to benign conjunctival nevi ($p>0.0001$)), 5-hmc loss being identified in 52.3% of the melanoma. In the melanomas, 5-hmc loss was significatively correlated with the depth of invasion ($p=0.0043$) and local lymphatic invasion ($p=0.0149$). There was no correlation with the proliferation index, local recurrences, metastasis and death.
Conclusions Our results demonstrate in vivo a significant downregulation of 5-hmc in malignant conjunctival melanocytic proliferations suggesting that similar epigenetic modifications occur in conjunctival and cutaneous melanoma. Restauration of 5-hmc loss in conjunctival melanoma might represent a potential therapeutical epigenetic option for this tumor.

• 2753

Outcomes after surgical resection of lower eyelid tumors and reconstruction using a septal chondromucosal graft and an upper eyelid skin flap

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Purpose Surgical excision of large malignant lower eyelid tumors may cause important full-thickness eyelid defects. The reconstruction of such defects must reestablish an acceptable aesthetic result and also restore the physiologic function of the eyelid.
Methods We report the outcomes of full-thickness excision of tumors extending over half of the horizontal lid length, followed by reconstruction using a septal chondromucosal graft (coming from the ipsilateral nasal cavity) and an upper eyelid skin flap. Histological analysis of the specimen identified the tumor type and surgical margins for each patient.
Results 25 patients were operated with this technique between March 2009 and June 2015: 17 basal cell carcinomas, 3 spindle cell carcinomas and 5 conjunctival melanomas (out of which 2 were associated with lentigo malignant melanoma). Mean duration of follow-up after surgery was respectively 36, 41 and 17 months for each of these 3 tumor types. We found a single local tumor recurrence and it was a basal cell carcinoma in a xeroderma pigmentosum patient. We describe some of the possible surgical complications and functional sequelae.
Conclusions In the case of eyelid tumors, the need to perform complete oncologic excision with margins adapted to tumor type may result in the removal of an important part of the eyelid. Several surgical techniques are available for lower eyelid reconstruction; the choice of the technique and its results depend mainly on the surgeon's experience.
In malignant tumors, complete surgical excision with margins adapted to tumor type prevents local recurrence in most cases. Our repair strategy gives good aesthetic and functional results.

• 2754

Cyberknife treatment in adenoid cystic carcinoma of the lacrimal gland

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Purpose To determine the effectiveness of Cyberknife radiotherapy in Adenoid Cystic Carcinoma of the lacrimal gland.
Methods Five patients with pathologically proven adenoid cystic carcinoma of the orbit were included in our study. All received 1-2 sessions of Cyberknife treatement in between 1-5 fractions after surgical resection of the tumor. Clinical characteristics and outcome of treatment were discussed in depth.
Results : All patients except one case were under 25 years old at diagnosis. Bone involvement was present in four cases. Tumor was removed as much as possible in all cases. All patients received additional cyberknife radiotherapy for the residual tumor. Tumor recurrence was seen in four cases and additional surgical resection was required in all. Additional second session Cyberknife was applied in two cases. One of these two developed radiation induced keratopathty, none developed radiation retinopathy
Conclusions Cyberknife radiotherapy is an effective and repeatable method in adenoid cystic carcinoma of the orbit.

• 2755

4 Gy radiotherapy in 6 patients with orbit marginal zone lymphoma: A small case series

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Purpose To demonstrate therapeutic approach with low dose radiotherapy of 4 Gy in 6 cases of marginal zone lymphoma (2 lacrimal gland cases, 1 conjunctival case and 3 orbital cases itself)
Methods Small case series of 6 patients with ocular marginal zone lymphoma, including diagnostic and therapeutic options
Results In 6 patients (58 to 86 years) a marginal zone lymphoma of the orbit was diagnosed. A proptosis of the eye could be observed in one patient with lacrimal gland tumour as well as in three patients with orbital lesions itself. Two patients showed additional eye movement retraction accompanied by diplopia. In addition to a thorough ophthalmological examination, the staging of patient included ultrasound of the orbit, MRI of the head, gastroscopic examination and a PET-CT of the whole body was performed. In all cases the diagnosis was made by ocular pathology.A focal radiotherapy with 4 Gy in two fractions was the only treatment in 5 cases. In one case a combination with additional systemical rituximab was necessary. A regression of all lesions could be observed and no tumour relapses occured until 7-29 months later.
Conclusions In cases of orbit MALT lymphoma a gold standard radiotherapy of 30 Gy in 15 fractions was established. However in our small case series of 6 patients a complete regression of tumour mass was shown using 4 Gy in two fractions. Depending on the general state of the patient a reduced radiation therapy remains a usefull alternative.

• 2756

Sequential bilateral optic nerve infiltration as the sole manifestation of relapsed T-cell lymphoblastic lymphoma: a case report

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Purpose Central nervous system(CNS)involvement in non-Hodgkin lymphoma (NHL)is well-known,occurring in approximately 10% of all cases.Among these, infiltrative lymphomatous optic neuropathy (LON) affects 5% usually in the setting of active CNS disease. However, isolated LON in relapsed NHL remains exceptionally rare. Herein, we present a unique case of sequential bilateral optic nerve infiltration as the sole manifestation of relapsed T-cell lymphoblastic lymphoma.
Methods case report
Results A 30-year-old male patient diagnosed as a case of mediastinal T-cell lymphoblastic lymphoma (LBL).Staging CT confirmed no other site was involved. He received chemotherapy as per protocol.Re-evaluation with chest CT showed complete resolution of the mass. Five weeks later,the patient presented to private hospital complaining of right eye pain with blurred vision and by the fifth day his vision deteriorated to no light perception.He was diagnosed as relapsed LBL with isolated right optic nerve infiltration and treated accordingly.Two months later,he presented to our center for the first time with left eye pain and blurred vision.Full eye examination revealed blind right eye with no perception of light. Retinal examination for right eye was consistent with combined retinal artery and vein occlusion. Left eye fundus examination revealed gross swelling of the optic disc.Brain MRI showed swollen left optic nerve with no mass occupying lesion.He was treated promptly with radiotherapy and planed for re-induction chemotherapy.
Conclusions Optic nerve infiltration represents an ocular emergency where timely diagnosis and intervention can prevent the irreversible loss of vision. Ophthalmologists should keep high index of suspicion and consider prompt through eye examinations along with brain imaging in patients with history of lymphoma presenting with visual complaints.

• 2757

Clinical and instrumental diagnostics in patients with orbital metastasis

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Purpose To analyze the data of clinical and instrumental features of patients with metastatic lesions of the orbit.
Methods 26 patients (21 women and 5 men) with orbital metastasis aged from 42 to 84 years (mean - 57,3 ±11,2) were examined and treated in our department in the period from 2009 to 2014. All patients underwent a complete clinical and instrumental examination including CT (MRI) and ultrasound. Metastatic orbital lesions were confirmed morphologically (23 patients) and cytologically (3 patients).
Results A unilateral lesion of the orbit was found in 21 patients, bilateral - in 5 patients. 19 patients had a history of cancer before orbital symptoms appeared, in 3 patients - orbital symptoms preceded the identification of the primary tumor, in one patient - simultaneously with the primary focus (uveal melanoma with extraocular growth and metastasis to the contralateral orbit). According to CT and US data in 23 patients there were detected diffuse tissue with extraocular muscles involvement. The lesions mostly localized in the central and lower parts of the orbit (17 patients), rare - in the upper and outer (9 patients). Destructive changes in the orbital walls (by CT) revealed only in 4 patients. According to histogenesis the epithelial metastatic tumors were prevailed: breast cancer - in 13, gastric cancer - 3, kidney cancer - 2, thyroid cancer - 2, cancer of the uterus - 1; bowel leiomyosarcoma - in 1, uveal melanoma – in 1 patient. In 3 patients (11.5%) with morphologically confirmed metastatic cancer of the orbit the nature of the primary lesion was not identified.
Conclusions Breast cancer is most common in development of metastatic tumors. Medical history data, clinical and instrumental findings are informative to suggest malignancy in orbit, requiring the need for morphological verification of the diagnosis for adequate therapy.

• 2758

Grading iris color of post-mortem human eyes

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Purpose Iris colour encompasses a continuum from pale blue to very dark brown and is usually classified via a descriptive three colour scale: blue, green-hazel or brown. Digital imaging technologies provide an opportunity to quantify iris colour, and are increasingly used for studies of genetic variations in iris colour. We explored the use of digital imaging and colour space information for grading of iris colour in ***post-mortem*** eyes, including eyes with choroidal naevi.
Methods Post-mortem adult human irises (n=25) were examined and photographed using a Jenoptik digital camera and ProgResCaptureProv2.8.9 software. Standard lighting (colour temperature) and parameters for imaging were established and used for all specimens. Iris colour was graded (n=5) (using a nine-category system; Mackey et al. Clin Exp Ophthalmol, 2011). We also developed a method in Photoshop to express iris colour as Hue in the Hue, Saturation, Brightness (HSB) colour space, for comparison with the category grading.
Results Using the nine-category grading end-point grades (light blue and dark brown) were consistently graded. Intermediate grades were categorised differently for some observers, usually with adjacent categories. Green irises were not observed in this small series. Digital imaging using standard iris images and an averaging filter, provided colour information (Hue) for each iris. This allowed discrimination of iris colour compared to category grading.
Conclusions As expected category-grading was not always consistent between observers. We developed a digital imaging approach using HSB color space to give a H value for each iris. We are exploring the utility of processing functions such as gaussian blur. This approach provides a standard iris colour for ***post-mortem*** tissue and will be used for comparison with fundus colour..

• 2761

Using iPS cells to uncover cilia protein function and model disease

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Primary cilia are small, hair-like protrusions on most cells and the photoreceptor outer segment is a highly specialised light sensing primary cilium. Retinitis pigmentosa 2 (RP2) is a cilia and basal body protein that is involved in regulating ciliary protein traffic. Mutations in the ***RP2*** gene lead to a severe form of X-linked RP. Patient-derived induced pluripotent stem cells (iPSC) provide a potent new technology, which allows the directed differentiation of most cell types to model disease. Recent advances have included the differentiation of iPSC into retinal pigmented epithelium (RPE) cells and three-dimensional optic cups, which are stratified and express photoreceptor progenitor cells. We have reprogrammed skin fibroblasts from an RP2 patient, carrying the most common RP2 stop mutation R120X, into iPSC and differentiated them into RPE cells, allowing us to study RP2 mutation disease mechanisms in vitro. Using translational read-through drugs (PTC124 and G418) we have successfully restored full-length, functional RP2 in these cells. Therefore, using iPSC to model disease in relevant cell types and tissues provides an important tool for the evaluation of potential therapies.

• 2762

Searching for the molecular causes of syndromic inherited retinal degenerations

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Syndromic inherited retinal degenerations (IRDs) include a large group of diseases, called ciliopathies, which affect primary sensory cilia. These rare genetic disorders may affect one or multiple organs including the retina, central nervous system, olfactory epithelium, cardiovascular system, liver, kidneys, skeletal system, gonads and adipose tissue. Mutations in a single gene may lead to an isolated or syndromic phenotype and mutations in at least fourteen genes have been shown to lead to an isolated or a syndromic form of IRD. In certain cases this broad phenotypic spectrum can be explained by the primary disease-causing mutations in the ciliopathy gene; however in other instances, the relationship between the primary mutation and the phenotype is not clear and epistatic effects of other alleles have been suggested. The presentation will discuss the genetics behind the broad phenotypic spectrum of ciliopathies and will show strategies for functionally classifying mutations, using the ***Intraflagellar Transport 172*** (***IFT172***) gene as an example.

• 2763

Syndromic paediatric vitreoretinopathies

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Abstract not provided

• 2764

Molecular genetic basis of Usher syndrome in the Czech population

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A systematic literature search of the PubMed database (1 March 2016) using keywords "Usher syndrome" AND "mutation" AND "Czech Republic" (or Belarus, Bulgaria, Estonia, Hungary, Latvia, Lithuania, Moldova, Poland, Slovakia, Romania, Russia, Ukraine) yielded 3 results. After inspection of retrieved abstracts we concluded that none of the published patients had an established molecular genetic cause of Usher syndrome. This is in striking contrast to numerous reports from Western European populations. In this presentation we will discuss our recently established program at a tertiary referral centre in Prague to genotype patients with Usher syndrome. So far 17 probands and 27 unaffected first degree relatives have been examined and donated DNA samples. The search into the molecular genetic causes is ongoing, however it is already apparent that there is an overrepresentation of the c.11864G>A; p.(Trp3955*) mutation in ***USH2A*** which was found on at least one allele in 9 probands (53%). The impact of our findings on clinical care and their potential to provide translational outcomes will be discussed. The spectrum of mutations identified in Czech Usher syndrome patients may also be relevant for neighbouring countries.

• 2771

Inflammation The good and the bad

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Inflammation at the ocular surface is the most commonly encountered pathology in Ophthalmology, irrespective of age, gender, race or geographical area. Inflammation in the form of primary keratitis of any origin represents a real threat for visual loss. The commonest way though to eventually have a vision-threatening corneal problem is as a consequence of an inflammatory process initiated in the eyelid margin (i.e. meibomitis), in the conjunctiva (i.e. conjunctivitis that eventually develop into kerato-conjunctivitis) or Dry Eye Disease (DED).
DED serves as an example which explains the role of the lacrimal functional unit (LFU). The LFU, initially defined in 1988 and later expanded, comprises the ocular surface (cornea, conjunctiva, limbus, and tear film), all tear-producing glands and cells (lacrimal glands, mucus producing system and Meibomian glands) and all the neuro-hormonal controlling interactions. Thus, the LFU is a crucial concept to understand how inflammation in a tissue not belonging to the optic system (i.e. eyelids or conjunctiva) may end up causing visual disability by involving the visual axis in the cornea. Examples of inflammation in the LFU as well as their deleterious consequences will be presented.

• 2772

Quantifying Inflammation as a common component of eye disease

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Inflammation accompanies most pathologies regardless of their origin. Inflammation can become part of the pathology as well in the form of heightened fibrosis or some other adverse outcome. As part of innate immunity it is often desirable to monitor the level of inflammation as part of the response, using the tears as source of proinflammatory mediators coupled with mass spectrometry it is feasible to identify and measure levels of critical tear proteins such as S100A8, S100A9 and alpha-1-acid glycoprotein in patients with diseases such as dry eye. These S100 proteins are particularly interesting as they are likely from tear PMNs, they act in both monomeric and dimeric form, and are particularly involved in calcium regulation. These have been noted to be upregulated in most ocular pathologies. As these can be readily quantified they provide a background to determine the relative levels in different ocular diseases.

• 2773

Tear lipids in corneal stress and inflammation

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Traditionally, ophthalmology was based on observing, trying, deducing and remembering. Yet, this view is rapidly changing. Research in the field of cornea and ocular surface has made significant advances in recent years. In this field major advances have been made in understanding the pathophysiology of common corneal and ocular surface disorders and moreover, we are beginning to understand that fats or lipids play a major role in the pathogenesis of these diseases. This has only been possible because of translational applications and approaches as well as methods to investigate 'big data' This talk will provide a short summary of some of the translational research performed in our lab in understanding the pathogenic mechanisms and the role of lipids in corneal diseases.

Conflict of interest
Any consultancy arrangements or agreements:
Allergan, Alcon, Croma Pharma, Santen, Thea

Any Lecture fee paid or payable to you or your department:
Allergan, Alcon, Santen, Thea

• 2774

Tear fluid biomarkers, conjunctival inflammation in glaucoma

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Ocular surfaces are protected, nourished and lubricated by tear fluid and are exposed environmental factors, topical ophthalmic drugs. Inflammation and wound healing are vital processes involved in the defense mechanisms and in the pathogenesis of many eye diseases. Chronic topical medication is known to affect ocular surface eliciting inflammation, activating wound healing and worsening the success of glaucoma surgery. We used proteomics
as a powerful tool to diagnose ocular surface diseases and detect pathogenic mechanisms and biomarkers in glaucoma patients.
Tear fluid and conjunctival tissue specimens of glaucoma and control patients were analyzed by using proteomic and histological techniques. Proteomic analyses were performed with NanoLC-TripleMSTOF MS using SWATH acquisition. For library generation UniProtKB/SwissProt database was used.
Proteomic analysis of conjunctiva demonstrates protein profile of >2000 proteins. Pathway analysis allowed analysis of processes like inflammation and wound healing. It will also give an opportunity to further analyze the role of pathogenic mechanisms leading to failure in glaucoma surgery and to develop novel diagnostic tools, biomarkers and therapies for glaucoma patients.

• 2781
Transparency of the lens and the eye

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Eye media transparency, and in particular that of the crystalline lens, is a requirement for good vision. Incipient lens opacification reduces retinal illumination and also increases intraocular scattering, producing unwanted visual artifacts, such as glare, that affect retinal image quality. A ripe cataract results in blindness.

Even before a cataract can be observed and diagnosed, intraocular scattering is known to gradually increase with age but also to depend on genetic and environmental factors. Precise quantification of intraocular scattering can be a very useful tool to study some aspects of the eye's aging process and to develop an objective classification method for cataracts. However, this is not a simple task, especially at an early stage. In recent years, several objective, subjective or mixed-approach procedures and devices have been developed, aiming to tackle this issue.
In this talk, the effects of a decreased lens transparency and increased will be summarized, the factors involved in the progression of this condition will be reviewed, and the methods to quantitatively study the problem will be briefly discussed.

• 2782
Effects of a thiol antioxidant in various cataract models

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Cataracts are the most common cause of treatable blindness worldwide, and result from loss of transparency of the lens. It has been demonstrated that oxidative stress plays an important role in cataract etiopathogenesis. Oxidative damage reduces solubility of crystallins, the main structural proteins of the lens, resulting in opacification. Cells have evolved to combat this damage with antioxidant enzymes and low molecular weight antioxidants such as glutathione (GSH). Our primary objective was to evaluate a GSH prodrug for cataract treatment because current surgical options are neither economical nor safe. Recent literature indicates that thiol compounds like N-acetylcysteine (NAC) may ameliorate the risk for cataracts. Our data indicates that the analog of NAC, N-acetylcysteine amide (NACA), is more effective than NAC due to its higher bioavailability. Therefore, the present study was performed to determine whether NACA is also effective in sodium selenite and L-buthionine-(S,R)-sulfoxamine (BSO)-induced cataracts. In both models, NACA significantly decreased lens opacity and improved redox balance. The data suggest that NACA has the potential to significantly improve both patient health and the clinical treatment of cataracts.

• 2783
Lanosterol reversal of protein aggregation in cataract

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The human lens is comprised largely of crystalline proteins assembled into a highly ordered, interactive macro-structure essential for lens transparency. Any disruption of protein interactions will alter this delicate structure, with consequent protein aggregation and cataract formation. Cataracts are the most common cause of blindness, and currently the only treatment is surgical removal of cataractous lenses. The precise mechanisms by which lens proteins prevent aggregation and maintain lens transparency are largely unknown. Lanosterol is an amphipathic molecule enriched in the lens. It is synthesized by lanosterol synthase (LSS) in a key cyclization reaction of a cholesterol synthesis pathway. Here we identify two distinct homozygous LSS missense mutations in two families with extensive congenital cataracts. Both of these mutations affect highly conserved amino acid residues and impair key catalytic functions of LSS. Treatment by lanosterol, but not cholesterol, significantly decreased preformed protein aggregates both in vitro and in cell-transfection experiments. Our study identifies lanosterol as a key molecule in the prevention of lens protein aggregation and points to a novel strategy for cataract prevention and treatment.

• 2784
Photochemical reversal of cataract

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Globally, cataract is the second leading cause of blindness. Current treatment consists of surgical removal of the lens of the eye. Although sight-threatening complications are rare they do occur. Opting for a non-surgical treatment would abolish the risks associated with a surgical procedure (e.g. infection, bleeding, retinal detachments). Cataract is caused by a clouding of the lens due to accumulation of large protein aggregates. We have proposed to photochemically reverse the optical deterioration of the aged human lens. We have shown on human donor lenses that irradiation with visible light significantly improves the transmission of light through the lens. Although these results are promising, visible light may not be an attractive option for photochemical reversal of cataract due to the risk of retinal light induced damage. To overcome this obstacle, we have shown that the same effects can be obtained via two-photon photolysis using a safe infra-red femtosecond pulsed laser. Clinically relevant effects (up to 15 years of optical lens rejuvenation) have been demonstrated.

• 2785

Pharmacological restoration of transparency in cataract

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Cataracts are the leading cause of blindness in the world, currently treatable only with surgery. The molecular chaperone α-crystallin helps to maintain the transparency of the crystallin lens. The soluble fraction of this protein decreases with aging, a phenomenon that is associated with presbyopia and age-related cataract. Moreover, destabilizing mutations in α-crystallin are associated with early onset, hereditary cataract. We hypothesized that a ligand that binds and stabilizes α-crystallin may prevent its aggregation, representing a strategy for preventing or even treating cataract. We developed computational and experimental high-throughput screening techniques to identify small molecule ligands for α-crystallin. These molecules prevented and reversed protein aggregation and improved lens transparency when dosed to mice with cataracts. The presentation will include a discussion of the potential of the molecular chaperone α-crystallin as a target for therapeutic intervention in cataracts. The safety, efficacy, bioavailability, and mechanism of the active compounds will be discussed, along with considerations of how a potential pharmacological intervention might complement the existing surgical treatment paradigm.

Conflict of interest
Any post or position you hold or held paid or unpaid:
ViewPoint Therapeutics, Inc. (Founder and Employee)

Any Stocks or shares held by you or an immediate relative:
ViewPoint Therapeutics, Inc.

EVER 2016
Friday, Oct 7

• 3111

OCT-A physics, instruments and limits of clinical application

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Abstract not provided

• 3112

OCT-A in neovascular age related macular degeneration

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The author reports regression and progression of CNV after treatment. Normal cycle lasts about 70 days. Abnormal recurrences are reported

Conflict of interest
Any consultancy arrangements or agreements:
Optovue consultant

• 3113

OCT angiography in Retinal Angiomatous Proliferation

SOUBRANE G
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Retinal Angiomatous Proliferations (RAP) have been described initially on ophthalmoscopy as a chorioretinal anastomosis in a late stage of AMD and of MACTEL. Fluorescein angiography evidences a dilated perimacular retinal capillary with late profuse leakage of dye. ICG angiography is instrumental to detect Retinal Angiomatous Proliferation at an early stage of development, especially in AMD. A localized effraction of the RPE on OCT evidences the communication between retinal and choroidal circulation with massive fluid infiltration of the retina. The basic idea of OCT angiography was to separate moving objects from static tissue. This new technic is suitable for 3D segmentation and reconstruction of the retinal capillary layers. There are a number of questions that OCTA may help to solve. What is the participation of the deep retinal capillary plexus to the clinically visible RAP? Is the portion perpendicular to the retinal plane a capillary of the intermediate layer? Does RAP involving only the deep retinal plexus exist? Is the PED part of the process? OCTA may be of great value to the understanding of the pathophysiology of the early stage of the disorder and may offer noninvasive monitoring of the disease progression and activity, aiding for each treatment assessment.

• 3114

Diabetic maculopathy: Confrontation of FA and OCT-A findings

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(1) Centre de l'Odéon, Paris, France
(2) Centre Hospitalier Intercommunal de Créteil, Department of Ophthalmology, Creteil, France
(3) University of Perugia, S. Maria Della Misericordia Hospital, Perugia, Italy

Purpose: To perform a qualitative and quantitative assessment of the foveal microvasculature in diabetic maculopathy using OCT-A. Methods: Retrospective case series of 50 eyes with DM and 30 eyes of age-matched controls, evaluated by conventional multimodal imaging and Spectralis OCT-A Clinical features of DM were qualitatively analyzed and recorded on OCT-A images. Moreover a fully automated micro-structural analysis of the FAZ(area, perimeter, major axis, orientation), foveal vessel's density and non-perfused areas was performed. Quantitative values were then compared with those of healthy subjects. Results: In the superficial capillary plexus, non-perfused areas were present in all DM eyes. Conversely, in the deep capillary plexus, non-perfused areas were detected in a lower number of cases. No significant differences were found in number of microaneurysms . Capillary density values were significantly lower in nearly all layers of DM patients . There was high ($p < 0.05$) inter-observer agreement . Conclusion: OCT-A is a useful technology for detecting DM abnormalities .The fully automated quantitative retinal vascular analysis may offer an objective method for monitoring disease progression and response to treatment.

Conflict of interest
Any consultancy arrangements or agreements:
G Coscas is Consultant for Heidelberg Engeenering, Germany

• 3115

OCT-A and FA findings in ocular Drepanocytosis

AMBRESIN A
Jules-Gonin Eye Hospital, Medical Retina Unit, Lausanne, Switzerland

Sickle cell disease (SCD) can present various degrees of retinal vascular alterations both in the periphery and in the macular region. The aim of the presentation is to describe OCTA features of consecutive pediatric and adult SCD patients seen in the Medical Retina Unit of Jules Gonin Eye Hospital, Switzerland. Comparison of architectural changes will be made with fluorescein angiography.
Quantitative measures of vascular density, foveal avascular zone (FAZ) and non-flow area (NF) measured in the superficial capillary plexus (SCP) and the deep capillary plexus (DCP) using the automated software will be presented. Qualitative assessment of perifoveal architecture changes made on the central 3x3mm OCTA images will be detailed. Published studies on OCTA and sickle cell disease will be reviewed.

• 3116

OCT-A versus FA guided focal laser, in macular ischemic microangiopathies

POURNARAS C
Hirslanden- la Colline Ophthalmology Center, Memorial Rothschild Clinical Research Group, Genève, Switzerland

The clinically significant macular oedema, related to the macular microcirculation abnormal permeability, ischemic changes or aneurysmal changes, were identified during the evolution of the most common retinal ischemic micro-angiopathies.

Intravitreal anti-VEGF or steroids demonstrated their efficacy to reverse the macular blood retinal barrier changes, resolving the characteristic oedematous macular changes leading to the observed clinically significant functional improvement.

The confrontation of the OCT-angiography monitoring of the superficial and deep capillaries plexus changes to the fluoresceine angiography observed persistent leaking capillaries segment or micro-aneurysms, allows the applications precise focal laser treatment.
Intravitreal anti-VEGF associated to focal laser treatment results to superior functional results than intravitreal anti-VEGF alone in late onset treated BRVO cases.

• 3117

OCT-A and FA in irradiation induced microangiopathy

ZOGRAFOS L
Cabinet Privé du Prof. L. ZOGRAFOS, Lausanne, Switzerland

Irradiation induced microangiopathy of the macular area is a severe complication of conservative management of uveal melanomas with with proton beam teletherapy or plaque brachytherapy. It occurs in 20% to 30% of the cases according the position of the posterior margin of the tumor and the selection criteria for the various therapeutic options. The aim of this study is to present the anatomic damage observed in fluoresceine angiography and OCT-angiography as well as the modifications observed in B-mode OCT and OCT en face. Following the evaluation of 80 cases of irradiation induced maculopathy, the most meaningfull anatomic damage, which correlates with visual function are the modifications of the outer perifoveal capillary plexus. According the results of this study, a therapeutic approach with anti-VEGF's can be considered in all the cases presenting minimal or mild vascular damage.

• 3121

The role for the Xen gel stent implant in glaucoma treatment

STALMANS I
UZ Leuven, Ophthalmology, Leuven, Belgium

Trabeculectomy is till the gold standard in glaucoma surgery because it is an effective technique to lower intra-ocular pressure. However, this surgical technique is associated with a risk of vision-threatening complications. Therefore, great efforts have been made in the past decade to develop a safer alternative. A plethora of surgical implants have been developed, targeting Schlemms canal, the suprachoroisal or the subconjunctival space.
The XEN gel implant is a collagen-derived device which is implanted ab-interno using an inserter with a hollow needle. This is the only minimally invasive glaucoma surgery (MIGS) which targets the subconjunctival space, thus creating a filtering bleb. During this lecture, the techology, implantation technique and practical tips and tricks for per- and postoperative management will be discusssed. Moreover, the one-year efficacy and safety results of an ongoing phase IV trial (the APEX study) will be presented.

Conflict of interest
Allergan, AqueSys

• 3122

High-intensity focused ultrasound treatment for open angle glaucoma

APTEL F
University Hospital of Grenoble, Department of Ophthalmology, Meylan, France

Many physical methods have been proposed to destroy the ciliary body, resulting in coagulation necrosis following heating (laser) or freezing (cryotherapy). These methods have two major drawbacks: they are nonselective for the target tissue and have an unpredictable dose–effect relationship. To overcome these drawbacks and take advantage of recent breakthroughs in the field of high-intensity focused ultrasound (HIFU) technology, a new device was developed to achieve a selective coagulation of the ciliary body while sparing the adjacent structures. This device is a ring-shaped probe with six miniaturized HIFU transducers. Experimental studies have shown a selective coagulation of the treated ciliary processes. Four clinical studies have been conducted. The first one was a pilot study designed to evaluate the safety in a small number of eyes with refractory and advanced glaucoma. The two other studies were multicenter studies designed to evaluate the efficacy and safety in eyes with open-angle glaucoma and less advanced disease, but still refractory to filtering surgery. Since these studies have demonstrated a nice tolerability, a fourth study was conducted in patients with early glaucoma naïve of any previous filtering surgery.

Conflict of interest
Any consultancy arrangements or agreements:
Consultant of EyeTechCare (Rillieux la Pape, France)

• 3123

Results for the Synergy trial: use of iStent in open angle glaucoma

GARCIA-FEIJOO J (1), Voskanyan L (2), Martinez de la Casa J M (3)
(1) Universidad Complutense, Hospital Clinico San Carlos. Instituto de Investigaciones BIomedicas HCSC. Institute Ramon Castroviejo, Madrid, Spain
(2) 1S.V. Malayan Ophthalmological Center, Ophthalmology, EREVAN, Armenia
(3) Universidad Complutense., Hospital Clinico San Carlos. Instituto de Investigaciones BIomedicas HCSC. Institute Ramon Castroviejo, Madrid, Spain

iStent aim to improve access of aqueous to Schlemm's canal and to the collector channels. IStent surgery can be performed on topical and intracamerular anaesthesia. The G1 Glaukos® trabecular micro-bypass is L-shaped titanium implant. iStent inject is conic and smaller than the G1and also made of titanium. The Stents are pre-loaded in the injector designed to deliver the stents into the Schlemm´s canal. For iStent inject Voskanyan et al (2014) conducted a multicenter study on 99 POAG patients uncontrolled on two or more topical medications. 66% of subjects achieved IOP≤18 mmHg at 12 months without medication, and 81% of subjects achieved Month 12 IOP≤18 mmHg with either a single medication or no medication. Mean baseline washout IOP values decreased by 10.2 mmHg or 39.7% from 26.3 (SD 3.5) mmHg to 15.7 (SD 3.7) mmHg at Month 12. Mean IOP at 12 months was 14.7 (SD 3.1) mmHg in subjects not using ocular hypotensive medications. The best indications for the trabecular stent are cases with primary open angle, pigmentary or PSX glaucoma. The ideal candidate for this surgery is a patient with early or moderate glaucoma, patients with compliance issues, bad tolerance to medical treatment or reluctant towards a chronic daily treatment.

Conflict of interest
Any consultancy arrangements or agreements:
Glaukos, IStar, Transcend, Ivantis.
Any research or educational support conditional or unconditional provided to you or your department in the past or present:
Glaukos, IStar, Transcend, Ivantis.

• 3124

How to tackle these difficult cases

ABEGAO PINTO L
Centro Hospitalar Lisboa Norte / Faculty of Medicine of Lisbon University, Department of Ophthalmology, Lisbon, Portugal

Recent technological advances have led to an increase in the number of options when choosing a glaucoma surgery. However, the boundaries of each technique have not yet been defined. Furthermore, profiling patients at risk for complications with these new techniques is still a difficult task as well as identifying the best options on how to solve them. Accordingly, a number of challenging cases will be presented to a panel of glaucoma specialists in order to create an open discussion on which would be the best surgical option and which would be the best strategy to achieve success.

• 3125

How to tackle these difficult cases

VANDEWALLE E
UZ Leuven, Ophthalmology, Leuven, Belgium

Real life cases will be presented. Their intraocular pressure is not sufficient controlled with topical eye drops alone. Each of the panel member will give their advice how to tackle those cases. This should give the audience guidance how to use the different new techniques in their clinical practice.

• 3131

Nanoparticles for ocular surface drug and gene delivery

KOMPELLA U B
University of Colorado, Department of Pharmaceutical Sciences, Denver- Aurora- CO, United States

Topically applied liquid formulations disappear rapidly from the eye surface due to nasolacrimal drainage. Along with the drop, the drug molecules including small molecules as well as macromolecules such as gene medicines are expected to clear rapidly, depending on their tissue affinity and rate of entry. Nanoparticles offer unique approaches to enhance and sustain ocular drug delivery following topical administration, especially for drug molecules with poor solubility or poor permeability and partitioning in eye tissues. Additionally, drug administration by invasive approaches are also feasible for ocular surface drug and gene delivery. When a drug is administered in its soluble form, it is likely to disappear rapidly from the site of injection. Nanoparticles are useful in such circumstances to sustain drug delivery. This presentation will provide an overview of nanoparticles including those based on pure drug as well as carrier materials for enhancing and sustaining ocular surface drug and gene delivery following topical or invasive administration.

• 3132

Magnetized nanoparticles for transfection of the corneal endothelium

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(2) Institute of Molecular Immunology- Experimental Oncology, Technische Universität, Munich, Germany
(3) Universität Duisburg-Essen, Dept. of Anatomy, Essen, Germany

This talk will present principles of transfection of corneal cells with magnetized nanoparticles. Transfecton efficiencies, particles preparations, apoptosis induction and functional approaches will be discussed. In addition, translational aspects will be highlighted.

• 3133

Layer-by-layer coated nanoparticles for glaucoma therapy: Focusing on the transport and cellular uptake in the trabecular meshwork

BREUNIG M , Guter M , Babl S , Liebl R
University Regensburg, Pharmaceutical Technology, Regensburg, Germany

Primary open angle glaucoma is one of the leading causes of blindness worldwide. The major risk factor is an elevated intraocular pressure (IOP), which leads to irreversible damage of the optical nerve head. Connective tissue growth factor (CTGF) is thought to be one of the major mediators of these pathological effects. Topical eye drops are the first-line medication for controlling an abnormally high IOP, but they have a long list of drawbacks. Consequently, there is a strong need for new therapeutic concepts to prevent vision loss.
We hypothesize that a reduction of CTGF would achieve a more permanent and causative effect in regulating the IOP compared to available standard treatment regimes. To follow up this goal we developed biodegradable layer-by-layer coated nanoparticles of well-defined physicochemical properties that carry therapeutic doses of small interfering RNA for CTGF silencing. The nanoparticles had a size of about 200 nm as determined by laser light scattering and a zeta potential of about - 18 mV. We tested the CTGF silencing efficacy of the nanoparticles in primary trabecular meshwork cells. In addition, we determined the diffusion of nanoparticles in collagen I as a model for the extracellular matrix (ECM) of the trabecular meshwork by fluorescence recovery after photobleaching. An important result was that hyaluronan is favorable material for nanoparticle assembly because it allows for receptor-mediated uptake of the nanoparticles into trabecular meshwork cells on the one hand, and may provide for good nanoparticle mobility in the ECM on the other hand.

• 3134

Recent progress in microrobots for ophthalmic therapies

ULLRICH F , Nelson B J
Multi-Scale Robotics Lab, ETH Zurich- IRIS, Zürich, Switzerland

Efficient ocular surgery must be precise, safe and cost effective. Minimally invasive microrobots for ophthalmic applications have been introduced for high precision motion with force feedback. Research demonstrates the potential of wireless magnetic microrobots for targeted drug delivery to the retina and operations in the posterior eye segment without the need for a vitrectomy.

• 3135

Collagen biomaterials for cornea regeneration - how does it work

GRIFFITH M (1), Reddy J (1), Liszka A (1), Lewis P N (2), Hayes S (2), Meek K M (2)
(1) Linköping University, Dept. of Clinical and Experimental Medicine, Linköping, Sweden
(2) Cardiff University, School of Optometry and Vision Science- College of Biomedical and Life Sciences, Cardiff, United Kingdom

We have previously shown in animal models and in early clinical studies that collagen-based biomaterials promoted functional regeneration of corneal epithelium, stroma and nerves. Recently, we showed that these fabricated implants were made of collagen fibrils that were fine and aligned, like those in human corneas. There were noticeable differences such as the uniaxial alignment of the implant fibrils compared to the biaxial alignment in the cornea, and the lack of D-banding of collagen fibrils in the implants. Nevertheless, the aligned fibrils facilitated an orderly in-growth of corneal stromal cells to form a neo-stroma. TEM examination showed the presence of extracellular vesicles (EVs) in the regenerating corneas. Immunohistochemistry showed that the EVs were positively stained for collagen amongst other cargoes. In implants made from short peptide analogs of collagen, alignment of short fibrils was observed. However these implants had a much higher number of EVs. This suggests that a combination of a scaffold comprising highly aligned fibrils mimicking the highly ordered corneal ECM together with elaboration of collagen and other ECM macromolecules is required for regeneration of a functional neo-cornea and not scar tissue.

• 3141

Overview of the epidemiology and pathology of conjunctival tumours

LOEFFLER K U
University Clinic, Ophthalmology, Bonn, Germany

Conjunctival lesions comprise a variety of benign, pre-malignant, and malignant tumours. While epidemiologic statistics are difficult and vary between populations, a correct diagnosis is pivotal for appropriate management. This presentation aims to demonstrate the most important conjunctival tumours and their histopathology thereby allowing for a better understanding of clinical features and the respective therapeutic intervention.

• 3142

Diagnostic modalities of conjunctival tumours

BLASI MA
University of L'Aquila, Ophthalmology, L'Aquila, Italy

Abstract not provided

• 3143

Treatment of conjunctival tumours

CAUJOLLE J P
Centre hospitalo-universitaire de Nice- Hopital St ROCH, ophtalmologie, Nice, France

The treatment of benign and premalignant conjunctival tumors can be done by excisional biopsy and/or chemotherapy.
However, the treatment of malignant conjunctival tumors by only surgical excision has a high local recurrence and mortality rate. Progressively, additional treatments to the surgery have been suggested. Notably, different radiotherapy technics have improved the prognosis.
The main therapeutic basis are:
In case of premalignant tumors, depending on the histologic diagnosis and surgical margin you could have to use an additional chemotherapy.
If the diagnosis of malignant tumor is confirmed additional radiotherapy treatment must be used depending on the localization of the tumors and your habits: Conventional radiotherapy, brachytherapy or proton beam therapy with specific improvements in order to tailor the treatment to conjunctival tumors.
When a conjunctival melanoma is suspected, the surgery must be performed under general anesthesia. The excision must be carefully done to avoid spreading of tumor cells with the instruments during the excisional biopsy.

• 3144

Cell lines of conjunctival tumours and their potential use in research

JAGER M J, Cao J
LUMC, Ophthalmology, Leiden, Netherlands- The

Conjunctival melanoma is a rare malignancy, which may give rise to metastases. An effective treatment of these metastases is as yet lacking. Conjunctival melanoma have been found to share specific mutations with cutaneous melanoma, such as mutations in the BRAF genes. As specific treatments have been developed for cutaneous melanoma, one can either try these in patients, or find ways to screen drugs in models of conjunctival melanoma. Models include the use of conjunctiva melanoma cell lines, which can be grown in vitro or as xenografts in immunodeficient mice, in zebrafish, or in egg embryos. As there are only a few cell lines available, one may consider developing xenografts from freshly-obtained conjunctival melanoma, and then try to grow new cell lines, or trst drugs directly on these xenografts.
Using three cell lines with different growth characteristics, we studied the effect of several drugs on cell growth and apoptosis, and we determined immunological characteristics of these cell lines.

• 3145

Update on the 8th Edition TNM staging system for conjunctival tumours

COUPLAND S

University of Liverpool, Dept. of Pathology, Liverpool, United Kingdom

This presentation will provide an update on the 8th Edition of the Tumor Node and Metastasis (TNM) system for malignant tumours of the conjunctiva, which can be broadly grouped into conjunctival carcinomas and melanomas. The 8th Edition of the TNM staging of these tumours is presently being finalised by members of the Ophthalmic Oncology Tumour Force, a mixed and experienced international group of ophthalmologists, oncologists and pathologists who have extensively reviewed evidence in the literature to improve upon the 7th TNM Edition. Following sign-off by the American Joint Committee on Cancer (AJCC), the 8th Edition for all tumours, including those pertaining to the eye, the ocular adnexa and the orbit, will be available in the Autumn of this year, around the time of the EVER meeting,

• 3161

Ambient exposure of the ocular tissues to optical radiation

SODERBERG P, Yu Z, Talebizadeh N, Malmqist L, Sandberg Melin C, Galichanin K
Uppsala University, Ophthalmology- Dept Neuroscience, Uppsala, Sweden

Optical radiation is usually considered as radiation between 1 nm and 1 mm. The visible part of optical radiation typically extends from 400 nm and 760 nm. Optical radiation with wavelengths shorter than visible is referred to as ultraviolet radiation (UVR) and optical radiation with wavelengths longer than visible as infrared radiation (IRR). The most abundant source of optical radiation on the earth is daylight sun. The spectral emission of the sun is determined by the sun temperature, 5,778 K and the atmospheric attenuation. In environments with high backhground reflection of UVR the UVR from the sun at the surface of the earth may cause photochemical damage to the human eye. Humans have continuously increased the light load on the visual system by inventions like the fire, the incandescent- and the halogen- lamp, fluorescent tubes and recently the LED lamp. The primary emission from halogen lamps and fluorescent tubes contains enough UVR to cause photochemical damage to the eye if not fitted with suitable filters. Even when fitted with UVR blocking filters these sources increase the load of blue light on the retina that potentially causes photochemical damage. LED lamps used for illumination typically are blue emitting diodes with fluorescent coating that provides a white light sensation to the visual system. The spectral output typically has a strong peak in the blue balanced by a broad peak in red. The blue light potentially causes photochemical damage in the retina. The deviation of the spectral distribution of the LED lamp from that of the sun challenges the color perception of the visual system in the aging eye and after cataract surgery with blue blocking IOLs due to increased selective blue light absorption. Increasing use of IRR LEDs for remote sensing and control is a potential hazard to the anterior segment of the eye.

• 3162

Update on epidemiological evidence for an association between sun exposure and cataract

WEGENER A, Meyer L
University Clinics, Dept. of Ophthalmology, Bonn, Germany

There is currently substantial evidence for an epidemiological association between long-term daily sub-threshold exposure of the eye to mid wavelength ultraviolet radiation (UVR) from the sun and cortical cataract. Initial observation of a potential association between exposure of the eye to UVR from the sun were limited to case reports in regions with abundant sun hrs. In the late 1900 cataract incidence was correlated to meterological recordings of intense exposure of UVR direct to the surface of the earth and lack of use use of spectacles. It was subsequently pointed out that the ocular exposure to UVR from the sun substantially depends on exposure of the eye to indirect UVR from the sun rather than direct, indicating that only meterological observations is not sufficient to establish an epidemiological association. This triggered attempts to make personal dose estimations based on both meterological observations and concomitant interviews of use of sun-glasses, hats and behavior. An appropriate cross-sectional case-control study with personal dose estimation and graded cataract measurement demonstrated an association between cortical cataract and intermediate UVR-dose comparing Chesapeake Bay bay fishermen with mainland inhabitants in the same area in USA. A similar approach was later used in Australia and found a similar association. A Japanese group, using detailed monitoring of the distribution of light scattering in the lens demonstrated an association between incidence of lower nasal opacity in the lens and latitude spanning from the equator to Island. Later, a large number of epidemiological studies have confirmed an association between exposure to intermediate UVR and cortical cataract.

• 3163

Evidence for apoptosis in the lens after in vivo exposure to ultraviolet radiation

TALEBIZADEH N, Yu Z, Kronschläger M, Galichanin K, Söderberg P
Ophthalmology, Neuroscience Dep, Uppsala, Sweden

The eye is exposed to ultraviolet radiation (UVR) in daylight. Epidemiological studies suggest a dose dependent association between UVR and cataract development. Experimental data confirm that UVR induces damage in the lens epithelium and trigger apoptosis. The time delay between exposure and onset of apoptosis in the lens varies depending on the dosage of UVR. The higher the in vivo UVR dose, the faster the onset of apoptosis and the development of lens opacification. Apoptotic events in the epithelium precede macroscopic cataractogenesis. Lens epithelium is a primary target for UVR exposure. Immunohistochemistry shows that the expression of apoptotic markers, caspase 3 and p53, increase in the lens epithelium after radiation. TUNEL-labeling visualizes the transient increase of apoptosis products after UVR. After higher doses of UVR, apoptosis features are observed one hour after radiation. Transmission electron microscopy shows the multi-layered stack of epithelial cells, membrane infolds, nuclear fragmentation and chromatin condensation, phagosomes and apoptotic bodies, phagocytosis of apoptotic bodies and pyknosis. UVR causes apoptosis in the lens epithelial cells. The onset of apoptosis depends on the radiation dose.

• 3164

Is the increasing exposure of the eye to near-infrared radiation from remote controls and sensing a threat to the lens?

YU Z (1), Schulmeister K (2), Talebizadeh N (1), Kronschläger M (1), Söderberg P (1)
(1) Uppsala university, Neuroscience/Ophthalmology, Uppsala, Sweden
(2) Seibersdorf Labor GmbH, Lasers- LEDs and Lamps, Seibersdorf, Austria

The current safety guideline for near infrared radiation (IRR) exposure in the crystalline lens is based on thermal damage. However, two previous findings implied that there may be a cumulative photochemical effect. The present study aims to investigate if near IRR induces cumulative lens damage considering irradiance exposure time reciprocity. Before exposure, 6-weeks-old albino rats were anesthetized and the pupils of both eyes were dilated. Five minutes after pupil dilation, the animals were unilaterally exposed to 1090 nm IRR within the pupil area. Temperature was recorded with thermocouples placed in the selected positions of the eye. At the planned post-exposure time, the animal was sacrificed and the lenses were extracted for measurements of forward light scattering and macroscopic imaging. The findings that an in vivo 8 s exposure to near IRR at 1090 nm within the pupil resulting in a temperature rise of 10 °C at the anterior segment of the rat eye induced cataract with a time delay and no cumulative lens damage occurred after long term exposure to 1090 nm IRR, indicates that IRR at 1090 nm produces thermal cataract, probably by indirect heat conduction from absorption in tissues surrounding the lens.

• 3165

Is conversion of indoor illumination to LED-sources a threat to the retina?

BEHAR-COHEN F
INSERM U 598, Ophthalmology, Paris, France

Abstract not provided

• 3171

Challenges in the clinical applications of cornea limbal stem cells

FERRARI S

Fondazione Banca degli Occhi del Veneto, Research Centre, Venice, Italy

According to regulation (EC) 1394/2007 on Advanced Therapy Medicinal Products (ATMPs), manipulation of corneal limbal stem cells for clinical applications aiming to treat limbal stem cell deficiency (LSCD) has to be carried out in certified Cell Factories according to the Good Manufacturing Practises (GMP). For hospitals and tissue banks wanting to provide ATMPs many challenges lie ahead, including (**1**) setting up GMP laboratories, (**2**) validating personnel, procedures and analytical methods continuously and (**3**) dealing with the costs associated with the maintenance of pharmaceutical grade environments. Results from clinical trials have been reported by different groups worldwide and data are so promising that the European Medicines Agency has recently issued the first marketing authorization for a corneal stem cell-based ATMP. Despite this, the appropriate selection of the patients and follow-up analyses remain crucial for successful treatments. In the meantime, R&D studies are looking further ahead with research focusing on cell therapy-based strategies for the treatment of pathologies affecting the conjunctival epithelium and the corneal endothelium and on gene therapy approaches for rare disorders, such as the EEC syndrome.

• 3172

Regulating gene expression towards solving ocular surface diseases

MOORE T *(1), Atkinson S (1), Maurizi E (1), Schiroli D (1), Mairs L (1), Christie K (1), McLean I (2), Allen E (2), Pedrioli D L (2), Moore J (1), Nesbit A (1)*

(1) University of Ulster, School of Biomedical Sciences, Coleraine, United Kingdom

(2) University of Dundee, University of Dundee- Division of Molecular Medicine, Dundee, United Kingdom

Treatment of genetic eye disease poses significant medical and surgical challenges. We used a bioluminescent corneal reporter gene mouse model to assess efficacy and potency of a number of gene therapy approaches for corneal dystrophy. Various modalities were assessed for delivery of short interfering RNA (siRNA) targeting one of five mutant alleles present in the corneal bioluminescent mouse model enabling assessment of topical, subconjunctival and intrastromal delivery. Potent and sustained ***in vivo*** gene silencing >50% for up to 7 days was observed. This siRNA therapy only provides a transient silencing of the mutant allele, however, Type II Clustered Regularly Interspaced Short Palindromic Repeats (CRISPR)/CRISPR-associated nuclease 9 (Cas9) holds great promise to provide 'one off' permanent gene editing. Gene-specific cleavage of the mutant allele, with DNA repair and frameshift mutations resulted in mutant allele knockout sustained over many weeks. Optimal delivery of our CRISPR system to all layers of the cornea was assessed. This gene editing treatment offers exciting potential for translation into clinical treatment for a wide range of genetic diseases of the eye.

Conflict of interest

Any consultancy arrangements or agreements:

Professor Tara Moore undertakes consultancy work for Avellino Lab USA

• 3173

Advances in corneal endothelium engeeing for future transplantation applications

SHAHDADFAR A

Oslo, Norway

Abstract not provided

• 3174

The future of stem cell and cell therapy in ophthalmology

Ferrari S (1), Moore T (2), Shahdadfar A (3), PETROVSKI G *(4)*

(1) International Center for Ocular Physiopathology, Fondazione Banca Degli Occhi Del Veneto Onlus, Venice, Italy

(2) University of Ulster, School of Biomedical Sciences-, Coleraine- Northern Ireland, United Kingdom

(3) Center of Eye Research, Department of Ophthalmology- Oslo University Hospital and University of Oslo, Oslo, Norway

(4) University of Szeged, Department of Ophthalmology, Szeged, Hungary

The anatomical and biological properties of stem cells in the eye have been the topic of indepth research over the last few decades. Enormous advances in the cell and tissue isolation and cultivation techniques, as well as molecular characterization of the different cell populations have been achieved, next to the major advances made in the bioscaffolds' engineering for cell delivery and treatment of eye diseases. Advances in the cell and gene therapy have reached culmination with the human cornea being at the top and holding great promise in treating eye disorders. The eye is indeed a golden mine for stem cells. This session will include lectures from European experts in the field with high international recognition and large collaborative networks. Challenges in the clinical applications of cornea limbal stem cells will be described, along with advances in corneal endothelium engineering for future transplantation applications. In addition, examples of regulating the gene expression towards solving ocular surface diseases will be shown, as well as future directions hallmarking stem cell and cell therapy in ophthalmology.

• 3181
Cases

AUDO I
Institut de la Vision- UMRS_968- Université Pierre et Marie Curie - Paris VI, Department of Genetics, Paris, France

Inherited retinal diseases are a heterogeneous group of disorders both clinically and genetically. Comprehensive analysis have helped better define phenotype correlations and also indentify novel clinical associations. Interesting cases will be presented to illustrate the spectrum of these disorders and diagnostic chanlenges

• 3182
Cases

HAMEL C
INSERM, U1051, Montpellier, France

Several cases of retinal dystrophies or optic neuropathies will be presented and the genotype phenotype correlation will be discussed.

• 3183
Cases

LIŠKOVA P
Charles University, Institute of Inherited Metabolic Disorders, Prague, Czech Republic

The spectrum of monogenic ocular disorders identified in the Czech Republic is diverse. Interesting cases will be presented.

• 3184
Cases

HOLDER G
Moorfields Eye Hospital, Electrophysiology, London, United Kingdom

Abstract not provided

• 3185

Cases

LEROY B

Dept of Ophthalmology & Ctr for Medical Genetics, Ghent University Hospital, Ghent, Belgium

Cases in ophthalmic genetics
Clinical cases will be shown. Everyone is encouraged to present unknown of interesting diagnostic cases in inherited eye disease. Submission of cases can be done in the room where the Grand Rounds in Ophthalmic Genetics are being held.

• 3311

Introduction and overview on animal models used in ocular oncology

IAGER M
LUMC, Ophthalmology, Leiden

Abstract not provided

• 3312

Use of the chick embryo model in uveal melanoma

KALIRAI H
University of Liverpool, Molecular and Clinical Cancer Medicine, Liverpool, United Kingdom

Abstract not provided

• 3313

Uveal melanoma patient-derived xenografts

DECAUDIN D
Institut Curie, Clinical Hematology, Paris, France

Abstract not provided

• 3314

Use of the zebrafish model in uveal melanoma

MIONE M
Karlsruhe, Germany

Abstract not provided

• 3315

Orthopedic xenograft mice model of retinoblastoma

CASSOUX N
Institut Curie, Ophtalmology Oncology, Paris, France

Abstract not provided

• 3316

Intraocular lymphoma models

FRENKEL S
Hadassah Hebrew University Medical Center, Ophthalmology, Jerusalem, Israel

Abstract not provided

• 3317

Summary and future directions

COUPLAND S
University of Liverpool, Dept. of Pathology, Liverpool, United Kingdom

Abstract not provided

• 3321

The immunohistochemical identification and localization of homocysteine in the human retina with the features of age related macular degeneration

OZIMEK M (1), Choragiewicz T (1), Junemann A (2), Rejdak R (1)
(1) Medical University of Lublin, General Ophthalmology, Lublin, Poland
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Purpose The purpose of this study was to determine the presence of homocysteine within the human retina with the features of age related macular degeneration.
Methods Immunohistochemistry was performed using anti-homocysteine rabbit polyclonal antibodies on sections of 7 human eyes enucleated because of the choroidal malignant melanoma.
Results Homocysteine immunoreactivity was found in humane retina. It was present in soft drusen, basal deposits and RPE presenting abnormal morphology. Hard drusen presented no staining.
Conclusions The presence of homocysteine in the human retina with the features of age related macular degeneration suggest that it may be involved in the pathogenesis of this eye disease.

• 3322

Treatment of neovascular age-related macular degeneration with anti-VEGF agents: predictive factors of long-term visual outcomes

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Purpose To evaluate the predictive factors of long-term visual outcomes in neovascular age-related macular degeneration (nAMD) treated with anti-VEGF agents.
Methods Unicentric retrospective review of patients with nAMD treated with anti-VEGF agents. Visual outcomes, 12 and 60 months after diagnosis, were evaluated: visual acuity (VA), VA variation, VA ≥65 ETDRS letters and VA variation >0 ETDRS letters. In the attempt to identify predictive factors of visual outcomes, the following variables were analyzed: at baseline, age, gender, VA, choroidal neovascularization subtype, central foveal thickness, presence of subfoveal hemorrhage or fibrosis, and treatment delay; during follow-up, frequency of medical examinations, missed medical examinations, intravitreal injections, missed injections and of treatment suspension, as well as the development of retinal atrophy, subretinal fibrosis, sudden massive retinal hemorrhage and retinal pigment epithelium tear.
Results One hundred and seventeen patients were included. In multivariate analysis, the only predictive factor of visual outcomes at 12 months was baseline VA: a higher baseline VA was associated with a higher final VA and a higher likelihood of final VA ≥65 ETDRS letters, but a smaller VA variation and a lower likelihood of VA increase. Baseline VA remained a predictive factor of all visual outcomes 60 months after diagnosis. Additionally, at 60 months, higher final VA was also predicted by a higher number of injections and no subretinal fibrosis during follow-up, and VA increase was more frequent in younger and female patients.
Conclusions Baseline VA influences absolute VA and VA variation at 12 and 60 months, while number of injections, development of subretinal fibrosis, age at diagnosis and gender are predictive factors at 60 months.

• 3323

Characterization, structural analysis, evolution of AMD drusenoid deposits "L", Lipid type and "P", Protein-cellular type, with multimodal imaging and morphology-structural software

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Purpose To study AMD drusenoid deposits "L"and "P" with multimodal imaging and morphology-structural software,see the input of this technique,software on their knowledge,etiopathogeny
Methods 284 eyes of 142 patients,44 men,98 women,with AMD drusenoid deposits "L",Lipid Type(soft Drusen,Drusenoid PED "L")and "P",Protein-cellular type (Pseudovitellifom AMD,Cuticular drusen,Subretinal drusenoid deposits(SDD),Drusenoid PED,"P").Deposits were evaluated by Autofluorescence,IR imaging,OCT,OCT en Face(Spectralis HRA-OCT),Morphology-Structural software(M-S software); Size,characteristics,number,topography of "L","P" deposits,their environment above and below too;ETDRS visual acuity(VA),complete ophthalmic examination,Fundus exam added.M-S software let analyze drusenoid deposit volume and contours,3D deposit reconstruction,let volume,density(deposits grey levels),structure(structural measures,texture parameters),composition(density calculation) evaluation and characterization of "L"and "P" type deposits
Results AMD Drusenoid Deposits:"L"are roughly uniform,dome-shaped,dark grey,translucent,equal and the same in all cross-section,fatty,under the Retinal Pigment epithelium(RPE),abnormal RPE above,but layer quite preserved,evolution to atrophy;"P"are dense,white,heterogeneous PED,below RPE,granular,as Protein,cellular component,different in all cross-sections,abnormal RPE above,heavily unstructured,layer interrupted,cells disappeared,evolution to neovascularization.M-S software allows selective drusenoid deposits characterization,differentiation:"L"ty pe,lipid components,"P"type,protein composition,so entities determination,so get morphologic,structural Biomarkers
Conclusions Multimodal Imaging,Morphology-Structural Software contribute to and improve AMD Drusenoid deposits "L","P",knowledge,identity,so,let define AMD biomarkers and better understand etiopathogeny

• 3324

Optimization of storage of differentiated retinal pigment epithelial cells

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Purpose The advancement of human retinal pigment epithelial (HRPE) cell replacement therapy for retinal blindness is partly dependent on optimization of cell culture, cell preservation, and storage medium. This study aims at optimizing the storage temperature and storage medium for HRPE cells.
Methods HRPE cells were cultured under standard conditions and randomized for storage at six temperatures (4°C, 16°C, 20°C, 24°C, 28°C, and 37°C) for seven days. After finding the optimal storage temperature, HRPE cells were subsequently stored at 4°C with and without the silk protein sericin added to the storage medium. Live dead assay was performed on all cell cultures including the unstored control cells. The phenotypic expression of premelanosomal protein-17 (Pmel17), cellular retinaldehyde binding protein (CRALBP), tyrosinase, and proliferating cell nuclear antigen (PCNA) were objectively measured using quantitative immunofluorescence. Morphology was analyzed using light microscopy, phenotypic expression of the junctional protein zonula occludens (ZO-1), and transmission electron microscopy (TEM).
Results Viability was maintained at all storage temperatures, except 24°C. The lowest number of dead cells were observed at 4°C (60% ± 18%; P=0.001, compared to control). Cultures stored at 4°C best resembled the morphology of the unstored control cultures. The addition of sericin to the storage medium maintained viability, improved pigmentation, and increased levels of tyrosinase (141% ± 1%; P=0.026) and premelanosomal protein-17 (252% ± 8%; P=0.014) following storage at 4°C.
Conclusions After seven days of storage, viability and morphology were best preserved at 4°C. Addition of the silk protein sericin to the storage medium maintained the characteristic HRPE morphology of the preserved cells, and improved pigmentation and phenotypic expression in cultured HRPE.

• 3325

Incidence of retinal vein occlusions (RVO) in patients treated with oral anticoagulants or antiplatelet drugs for cardioembolic or atherothrombotic prevention

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Purpose It is still a matter of debate whether anticoagulant or antiplatelet therapy are useful for the prevention of retinal vein occlusions. In some cases, patients who are already under antiplatelet or anticoagulant therapy still develop retinal venous diseases. We analyzed the prevalence of RVO in patients treated yet with warfarin or aspirin for other clinical indications.
Methods 64 patients (30 CRVO and 34 BRVO) treated with warfarin for atrial fibrillation (n=11) or aspirin for carotid stenosis (n=53) were observed. Multivariate analysis was employed to detect any putative relation among treatments and CRVO or BRVO.
Results The whole cohort analysis showed that aspirin was less effective than warfarin for prevention of RVO (H.R. 2.4, 95% C.I. 1.9-3.2 p< 0.01); 9 BRVO and 2 CRVO were in patients treated with warfarin whereas 25 BRVO and 28 CRVO in aspirin treated subjects. The confirmation test showed an H.R. of 2.1 (1.6-3.1 95% C.I.) p< 0.01, for the association between aspirin treatment and CRVO.
Conclusions Such retrospective data indicate that aspirin could be less effective in RVO and particularly CRVO prevention with respect to anticoagulants. Planned large prospective observational studies are needed to study the efficacy of such treatments in RVO prevention and treatment. Our data could fit well with the previous observation that specific pro-coagulative state as suggested by increased thrombin generation is a pattern of CRVO with respect to BRVO.

• 3326

Frequency doubling technology perimetry and retinal fiber layer correlation in type 2dDiabetics without retinopathy

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Purpose Alterations in visual field (VF) and retinal nerve fiber layer (RNFL) thickness were reported in diabetics. Little is known however about the extent to which VF and RNFL changes are affected and their correlations. The purpose was to assess the RNFL thickness and its correlation with VF parameters in type 2 diabetics without retinopathy with well controlled glucose level and good standard visual acuity.
Methods A total of 28 controls and 16 type 2 diabetics without retinopathy were recruited. VF was assessed with the frequency doubling technology (FDT) perimeter using the full threshold C-20 program. The RNFL thickness was acquired by the optical coherence tomography 200 x 200 optic disc cube scanning protocol. Forward stepwise multiple linear regression analysis was applied to rule out the independent association of the RNFL thickness with the FDT parameters.
Results Compared to the controls, the diabetics showed a trend of decreased RNFL thickness but was not significant, lower sensitivities for some VF locations, no difference in the mean deviation, and worse mean pattern standard deviation (PSD) (3.89 ± 0.36 vs. 3.47 ± 0.58 dB, $p < 0.05$). The RNFL thickness was significantly negatively correlated with PSD ($r = - 0.6$, $p < 0.05$).
Conclusions Apparent VF changes precede RNFL thickness thinning in type 2 diabetics without retinopathy. Also, the RNFL thickness shows a negative correlation with the PSD of the FDT parameter.

• 3327

Correlation between choroidal and retinal thickness in diabetic patients without diabetic retinopathy

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Purpose This study was design to examine the correlation between retinal and choroidal thickness in diabetic patients without diabetic retinopathy.
Methods 125 type 2 diabetic patients without diabetic retinopathy underwent a complete ophthalmological examination. Retinal total thickness and retinal layer automatic segmentation were assessed by using spectral domain optic coherence tomography (Spectralis Heidelberg Engineering). Retinal measures were made at fovea and at 3 mm temporal (T3), nasal (N3), superior (S3) and inferior (I3) to the fovea. Choroidal Thickness (CT) was assessed with enhanced depth mode (EDI) software (subfoveal and at 1000 µm temporal, nasal, superior and inferior to the fovea). Pearson correlations were analyzed between CT and RT (total and by layer) at the five locations of study: subfoveal CT with central RT; and CT at the 1000 µm temporal, nasal, superior and inferior to fovea's center with RT at the T3, N3, S3 and I3, respectively.
Results Diabetic patients were in average 66.9. ± 9.33 years old with an average disease duration of 93.50 ± 81.74 months. Except for the pigmented epithelium retinal layer, which showed a positive, but weak correlation with CT at N3, S3 and I3 (r between 0.25 and 0.32, $p < 0.05$), the analyze didn't showed a statistical significant correlation between CT and the thickness of the other retinal layers.
Conclusions Recent studies empathize the role of a choroidal vasculopathy in diabetic retinopathy pathogenesis. The absence of correlation between CT and RT may be related to changes in the choroid occur in earlier stages of the disease. Future longitudinal studies are needed in patients at different stages of diabetic retinopathy.

• 3328

SD-OCT for study of retinal layers segmentation in patients under Hydroxychloroquine treatment

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Purpose Hydroxychloroquine has been used for decades in treatment of rheumatic disorders. Macular toxicity is an adverse effect dependent to duration of treatment and daily dosage. Although, the exactly retinal structure under this toxic effect is not yet totally understandable.
To study the sectorial effect of Hydroxychloroquine in all retinal layers in 1st, 2nd, 3th and 6th mm centered on fovea by automatic segmentation using Spectral-Domain Optical Coherence Tomography.
Methods Retrospective, non-randomized study involving 44 eyes of 44 patients under treatment with Hydroxychloroquine. The authors have created two age-matched groups. A group 1 of patients in treatment duration under 10 years (n= 30) and a group 2 above 10 years of treatment (n= 14).
Results The inner retinal layers thickness of 1st and 2nd mm is impaired in group 2 but the results did not showed significant difference between groups. The automatically segmentation of layer by layer did not prove a sectorial defect in inner retina. The thickness of Outer Nuclear Layer (ONL) was impaired in group 2, in opposition to Outer Plexiform Layer (OPL). This analysis has demonstrated a tendency for inversion of ONL and OPL thickness values in both groups.
Conclusions The toxicity of Hydroxychloroquine apparently was not responsible for significant alterations in inner retinal thickness. That is a tendency for reduction in ONL thickness. The higher thickness of OPL in group 2 is a surprising aspect that needs additional analysis. The outcomes were very dependent to the limited number of patients in our sample. Further longitudinal studies about this topic will be necessary.

• 3331

How to make better, safer and easier endothelial controls of long-term stored corneas with Specular Microscopy?

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Purpose Unlike short term cold storage in which corneas remain clear and thin, long-term organ cultured corneas cannot be rated by specular microscopy (SM) because of the storage-induced stromal edema and deep endothelial folds. Aim: To present SM of corneas stored in our patented bioreactor (BR).
Methods Human corneas were stored in our BR, with a commercial medium containing 2% foetal calf serum at 31°C. The BR restored the intraocular pressure while renewing the medium. By preventing from edema and folding, it improved endothelial cell (EC) viability in the long-term. Two windows allowed easy multimodal corneal imaging. A new type of SM was developed (CMOS camera, x10 objective, collimated LED, micrometric stage). For each cornea, 5 images (centre+4 quadrants) were acquired at day 2 and 28 exactly in the same area, and treated with a custom-made software and ImageJ to determine the EC density (ECD).
Results All corneas remained thin and clear, allowing SM without deconditioning nor deswelling in specific media. The field of view of 935x748µm was 3 times greater than those of both commercial eyebank SM. At D2 and 28, despite shallow residual endothelial folds, large areas of ECs were clearly visualized. ECD could be determined on most images easily. Epithelial cells could also be observed.
Conclusions The BR combines the advantages of cold storage (closed system) and organ culture (long-term). SM allowed endothelial assessment of long term-stored corneas in our closed BR: it could make endothelial controls safer, easier and increase the cell count reliability especially thanks to a wider field of view.

• 3333

Influence of material compliance on human corneal stromal cell behaviour

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Purpose Due to a shortage of healthy donor tissue, bioengineering strategies for corneal regeneration are drawing more attention. It is well established that substrate stiffness has an effect on the proliferation and phenotype of many cell types. In this study, we aim to investigate the influence of the mechanical environment on corneal cell behaviour, by demonstrating the effects of varying material stiffness on the growth and morphology of human corneal stromal cells.
Methods Using blends of two commercially available polydimethylsiloxane (PDMS) elastomer kits, cured polymer substrates with elastic moduli ranging from 12 kPa to 3 MPa were achieved. Materials underwent tensile mechanical testing to 10% strain in order to determine elastic mechanical properties. Samples were coated with a thin layer of collagen I to promote cell adhesion.
Results Contact angle measurements were taken before and after protein coating, with a decrease in angle from 90.30 ± 0.47° to 73.26 ± 2.24°, indicating a significant increase in hydrophilicity of the PDMS. Phase contrast imaging was used to visualise differences in morphology of cells seeded onto the substrates, while actin and DAPI (4,6-diamidino-2-phenylindole) staining were employed to view differences in cytoskeletal structure under confocal microscopy. Cells on softer substrates displayed increased proliferation, as determined by AlamarBlue assay, with a notably spread and elongated fibroblastic morphology. Stiffer substrates induced increased cell aggregates, with a more dendritic shape visible. Gene expression of cells was also monitored by qPCR, with observed upregulation of collagen I, ALDH3A1 and keratocan, which was more pronounced in cells seeded on less compliant substrates.
Conclusions These results will be useful in future biomaterial scaffold designs for corneal tissue regeneration.

• 3332

Effect of biochemical cues on proliferation, phenotype and migration of human corneal stromal cells

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Purpose With the increasing demand for corneal replacements and a shortage of suitable donors, tissue engineering and cell based therapies have emerged as a possible solution. Understanding the influence that biochemical factors have on corneal wound healing is needed to improve tissue regeneration. Our aim was to investigate the effect of several molecules on human corneal stromal cells.
Methods Corneal fibroblasts were serum-starved for 72 hours in DMEM/F12 and then exposed to specific reagents for 7 to 14 days. The reagents examined in this study were ascorbic acid (AA), retinoic acid (RA), FGF-2, PDGF-BB, IGF, TGF-β1, TGF-β3, IBMX and insulin-transferrin-selenium (ITS). Proliferation was assessed by AlamarBlue assay, general morphology was monitored by bright field microscopy and the expression of keratocan, ALDH3A1 and smooth muscle actin (α-SMA) at the mRNA level was quantified by qPCR. Immunohistochemistry and western blotting were also performed to assess protein expression.
Results AA, IGF-1, RA and ITS increased the expression of keratocyte markers such as keratocan and ALDH3A1, while not increasing fibrotic/myofibroblast marker α-SMA. FGF-2 and PDGF-BB decreased expression of keratocan and ALDH3A1 without up-regulating α-SMA, suggesting a fibroblastic phenotype. TGF-β1 and TGF-β3 were shown to up-regulate α-SMA expression but TGF-β3 also up-regulated keratocan. All reagents apart from AA resulted in an increase in cell proliferation by day 7.
Conclusions This study demonstrates the influence different biochemical cues have on corneal stromal cells. These findings will be useful in developing the next generation of therapies for corneal diseases and injuries.

• 3334

Involvement of abnormally-activated CD44+ cells migrating from the iris to the center of the cornea in Fuchs Endothelial Corneal Dystrophy

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Purpose Normal regeneration of the adult corneal endothelium and cellular mechanisms involved in Fuchs endothelial corneal dystrophy (FECD) remain poorly understood. Aim: to present original observations establishing common ground between both mechanisms in order to open new perspectives in their understanding.
Methods 30 corneal buttons of FECD, and of other corneal diseases, 40 healthy whole corneas, and 6 whole corneas with early stages of FECD were used. Mean donor age was 72 years. Immunostaining on flat mounted corneas highlighted the expression of corneal endothelial cell (CEC), of stem cell, and of extracellular matrix (ECM) markers.
Results The central endothelium of FECD and the extreme peripheral endothelium of healthy corneas shared common features: a weak expression of CEC markers (Na+/K+ ATPase, ZO-1, COX IV, NCAM, CD166), expression of stem cells markers (nestin, c-myc, telomerase, CD44), similar characteristics in Descemet membrane (Guttae and Hassal-Henle bodies, high expression in col I, IV and V). An anatomical continuity and cell migration from the iris root, through TM, until the extreme peripheral endothelium was highlighted using col I and CD44. Similar CD44+ cells, and pseudo guttae were also observed in the central endothelium of corneal buttons with irido-corneal synechiae.
Conclusions Results suggest that a population of iris-derived CD44+ cells migrate through the TM to the extreme periphery to constitute a source for endothelium regeneration in healthy corneas; their abnormally-activated migration toward the center might cause FECD.

• 3335

Alterations in proliferative activity in the corneal endothelial periphery after transcorneal freezing

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Purpose To localise proliferating cells in the corneal endothelium after transcorneal freeze injury and detect possible progenitor cells.
Methods Endothelial cells (ECs) were disrupted by transcorneal freezing in 5-weeks-old rabbits. Concomitantly 10 mg/kg 5-Ethynyl-2'-deoxyuridine (EdU) was injected intraperitoneally and repeated after 24 and 48 hours. Animals were euthanized after 3, 5 or 40 days. Corneoscleral buttons were flat-mounted for immunohistochemical analysis of proliferation marker Ki-67 and detection of EdU, which is incorporated into the DNA during cell cycle S-phase. Ki-67+ and EdU+ cells were detected by fluorescence microscopy.
Results Transcorneal freezing induced a central endothelial lesion of approximately 5x5 mm. After three days the endothelial wound was almost completely repopulated by small ECs exhibiting strong Ki-67 expression and EdU incorporation. Furthermore, ECs in close proximity to the edges of the initial wound were positive for Ki-67 and EdU. In the control group no central Ki-67+ nor EdU+ ECs were detected. In the peripheral endothelium of the lesion group Ki-67+ and EdU+ ECs were often arranged in clusters of 100-400 cells, with 1-3 clusters per quadrant. This is opposed to the periphery of the control group where Ki-67+ and EdU+ ECs were abundantly present in all quadrants in a widespread pattern.
Conclusions The central ECs in 5-weeks-old rabbits do not proliferate when the cell layer is intact, but proliferates extensively in response to wounding and covers the defect within 3 days. In contrast to this, peripheral ECs are continuously cycling. After a central lesion, the pattern of proliferative cells in the periphery change from widespread cells to clustered cells. This specific cell pattern can be indicative of a stem/progenitor cell niche.

• 3341

Fine needle aspiration biospy or not?

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Thanks to the dramatic progress in the field of ophthalmic surgery (mini invasive surgery), sampling an eye is more and more used in ocular tumors. A biopsy can be done via a transcleral or transvitreal route to diagnosed difficult cases especially achromic ocular tumors. However, fine needle aspiration biopsy or biopsy with a vitrector handpiece is more and more used to stratified uveal melanoma patients into low risk, intermediate risk, and high risk of metastasis using genomic (using a-CGA or MLPA) or gene expression profile (GEP). The biopsy can be done before irradiation or the last day of irradiation or after irradiation (during an endoresection of the tumor). Large series have shown that the procedure is safe and efficient. The main issue is to deal with the results since we don't have to date an effective treatment for metastatic patients. However, tumor prognostication is important to develop because there is a learning curve for surgeon and to establish a good collaboration with the histopathology or genetic laboratories and new molecules are in the pipe (targeted therapies, immunotherapies) to treat metastatic patients in a close future.

• 3342

Endoresection or not?

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Eye salvaging treatment of large uveal melanomas by primary irradiation bear the risk of severe secondary complications due to tumour regression. The so called „toxic tumour syndrome" comprises a multitude of such problems such as retinal detachment, ocular ischemia, melanomalytic reactions, secondary glaucoma either by neovascularization or by tumour debris deposition or both. Surgical resection of tumours addresses these issues. Surgical resection can be performed either as an endoresection or as by means of transscleral resection. Both surgical procedures are challenging and pose by themselves some risks, which need to be addressed appropriately.

Conflict of interest
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• 3343

Cytogenetic or molecular analysis for prognosis?

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Prognostication in uveal melanoma can have several functions: to advice the patient, to council patients with regard to monitoring, and to stratify patients in trials. Scientifically, determination of the parameters that define the development of metastases is of interest to understand tumour behaviour and develop treatments.
The behaviour of tumor cells is related to changes at the DNA level, which lead to differences in mRNA, lncRNA, miRNA, and protein expression. A variety of tests using different technical platforms identify these differences, and can, after validation, be used for prognostication. Commonly-used tests use the chromosome status (chrom 3, 8q), or the RNA expression pattern (Class 1 and 2). Expression of BAP1 can also be used. Some patients with low risk uveal melanoma also develop metastases, and these have been associated with the presence of extra copies of chromosome 8q, and with a specific marker, PRAME.

The biological pathways that lead to metastases are still under investigation, although it is clear that a combination of loss of one chromosome 3 and loss of expression of BAP1 on the other chromosome 3 plays an important role in this pathway.

• 3344

Follow-up : which one and for whom?

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In theory, surveillance of patients with uveal melanoma is aimed at detecting and treating ocular recurrence and morbidity as well as systemic metastases. In practice, the scope of such follow-up is uncertain and controversial. Regular examination by an ocular oncologist can be difficult for patients who live far from the oncology center whereas inexpert ophthalmologists close to the patient's home may fail to detect tumor recurrence and other ocular morbidity in a timely manner. Screening for metastatic disease is expensive, can expose patients to harmful ionizing radiation, and only rarely seems to result in prolongation of life. Follow up protocols also have psychological impacts on patients, both positive and negative. There is scope for evidence-based guidelines, which at present are lacking. The aims of this presentation are to consider the benefits and costs of ocular and systemic surveillance and to propose suggestions for personalized care.

• 3361

Latest diagnostic possibilities in unsolved uveitis, suspicious for malignancy

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Vitreo Retinal Lymphomas (VRL) are rare malignancies that display a wide spectrum of clinical patterns. Almost all VRL are non-Hodgkin's lymphomas, B-cell sub-type. Since the clinical presentation of VRL might be confused with a non-responder eye inflammation, VRL are also known as "masquerade syndromes". On the basis of the potential severity of such disease, vitreous biopsy might be indicated for all the cases which can be potential VRL. Since vitreous biopsy is not diagnostic in all cases, further techniques can provide further essential data. Immunohistochemistry can be used for identifying important Cluster of Differentiation (CD) such as CD45 for leukocytes, CD20, CD79a, PAX-5 for B-cells, CD45RO for T-cells, and CD68 for macrophages. Furthermore, clonality can be established by using antibodies targeting the kappa and lambda light chains. Polymerase chain reaction gene rearrangement studies can identify monoclonality of the heavy chain variable (V), diversity (D), and joining (J) immunoglobulin gene segments. Recently, measurement of Interleukin (IL)-6 and IL-10 in aqueous and/or vitreous fluid can lead to the correct diagnosis, even though an elevated IL-10/IL-6 ratio is not specific for VRL.

• 3362

How to recognize a masquerade syndrome? What is the differential diagnosis?

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In masquerade syndromes, the clinical picture is mimicking uveitis. They are simulating a chronic idiopathic uveitis, but the underlying primary cause is not immune mediated. In most cases, there is a limited response to corticosteroid treatment. Being great masqueraders, infectious causes have to be ruled out first. Other causes of masquerade syndromes will be discussed, emphasizing malignant processes.

• 3363

How to perform a vitreal, retinal or choroidal biopsy? What justifies an invasive technique?

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A first question to ask is: what justifies the risk to be invasive? Although the risk profile of biopsy procedures has been reduced due to improvement of the technique, operating on an inflamed eye induces a higher perioperative risk. The technique, results and limitations of a single port vitreous biopsy procedure will be discussed, and compared with the diagnostic outcome after a full vitrectomy. Finally, the approach to obtain a chorioretinal biopsy will be highlighted, including risk profile and management of complications.

• 3364

Innovative pathology techniques for small tissue samples or cytology of vitreous biopsies

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Vitreal samples contain only very few cells in comparison with cytology specimens from other medical specialists and oncology samples. The gelatinous structure of fine fibrils in the vitreal gel interferes with normal cytology protocols. The former treatment of steroids induces apoptosis of fragile lymphoma cells. The rarity of these masquerade syndromes give less experience and causes delay in referring and diagnosis. For all these reasons a routine and standardized protocol in an experienced referral center is necessary. Concentration or centrifugation of the cells in solution is mandatory. The Cellient® from Hologic is an automated embedding system from a cytology specimen to a paraffin block. Very small fragments and cells or cell clusters can be automatically handled without loss of material. All routine histochemical and immunologic stainings can be performed on a small representative portion of the sample. Genetic analysis are possible with the used fixatives of PreservCyt® and Cytolyt®. Flow cytometry is an alternative way to discriminate the cells, but without histology.

• 3365

Applied genetic testing in ocular tumors

COUPLAND S

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Increasingly molecular pathology tests are being applied to ocular specimens, to aid the establishment of definitive diagnoses , to predict therapeutic responses, and to determine the prognoses in ocular oncology patients. This presentation will provide an overview of the most commonly used molecular tests in ocular oncology, outlining their strengths and weaknesses, and indicating when they are of appropriate use. The speaker will also provide recommendations for sample transport to the processing laboratory, in order to achieve best results in these often very small samples, and will explain how the reports are to be interpreted - when combined with morphological and immunophenotypical studies - for subsequent patient management.

• 3371

Diagnosis and management of cytomegalovirus anterior uveitis/ endothelitis in immunocompetent patients in 2 European referral centers

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Purpose To evaluate the methods leading to the diagnosis of CMV anterior uveitis (AU) and/or endotheliitis from 2 uveitis tertiary referrals centers and to assess the outcome after topical ganciclovir treatment.
Methods Retrospective study of patients with a clinical and biological diagnosis of CMV AU/endothelitis demonstrated by a positive polymerase chain reaction (PCR) and/or Goldmann-Witmer coefficient (GWc). The Belgian patients were treated with topical ganciclovir once the biological diagnosis was confirmed. The number of recurrences was evaluated in the pre- and post-treatment period.
Results We report a series of 21 patients (15 from Brussels and 6 from Utrecht) presenting clinical characteristics of CMV AU and/or endothelitis with a positive PCR and/or GWc for CMV. PCR was positive in 15/21 (71.4%) patients, while GWc was positive in 8/9 (88.9%), including 6 patients initially tested for PCR and GWc and 3 secondary tested for GWc when the PCR was negative. 2/9 patients (22.2%) were GWc+/PCR+, 6/9 patients (66.7%) GWc+/PCR- and 1/9 patient was GWc-/PCR+ (11.1%). Aqueous tap was repeated in 9 of the 15 Belgian patients (60%) (2 times in 6 cases, 3 times in 3 cases) to get the biological confirmation of CMV AU/endothelitis. Mean follow up duration was respectively 19.2±23.8 and 46.7±29.7 months in the pre- and post-treatment period. Patients had a significantly lower number of recurrences/ year post-treatment (0.76±0.57) than in the pre-treatment period (3.76±2.44) (p = 0.001).
Conclusions Repeated aqueous taps in order to perform PCR and GWc were found to be helpful to confirm biologically the clinical diagnosis of CMV AU/ endothelitis. Our results also suggest that patients with topical ganciclovir have a decreased frequency of CMV-AU/endotheliitis recurrence and keep a relatively good vision over time.

• 3372

Presentation and management of cytomegalovirus retinitis in immunocompromised children

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Purpose Cytomegalovirus retinitis in children is poor known and his management remains controversial. The objective of this study is to provide a precise clinical description and set a treatment protocol for a better management of these patients.
Methods Retrospective study including all children's eyes with primary immune deficiency (PID) patients with CMV retinitis confirmed by PCR on aqueous humor. The treatment protocol consisted of : an anti-viral treatment with intravitreal injection (IVT) associated with general treatment. The primary endpoint was the good response to treatment defined by a quantifiable vision at the end of treatment.
Results Fifteen eyes of 8 children aged 6 months to 10 years were included, of 156 children transplanted for PID. Each eye received 4.7 ± 2.5 IVT of Gancyclovir (12/15) or Foscarnet (3/15). The time between IVT was 4, 8 ± 2 days. A systemic treatment was initiated. Eight eyes were placed in the "good recovery" group (BR) and seven eyes of four patients in the "poor recovery" group (MR). In the BR group's initial involvement was peripheral or sectorial, while in the MR group achievement was broadcast for four eyes or sectoral reached the posterior pole for three eyes. The number of IVT by eye and the time between IVT were not different between the groups as well as systemic therapy. At the end of treatment in the BR group the posterior pole was normal for five eyes or showed a para-macular scar for three eyes. In the MR group, five eyes showed diffuse fibrosis and two macular scar.
Conclusions Visual prognosis seems related to the extent of the initial damage, the need for regular checks of the FO in children at risk is paramount. Regarding the treatment protocol, an average of four ganciclovir IVT to two per week without exceeding six IVT , combined with the general treatment appears to be an effective protocol .

• 3373

Validation of an antiretinal antibody detection strategy for the diagnosis of autoimmune retinopathies

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Purpose Antiretinal antibody (ARA) detection is a key element in the diagnosis of autoimmune retinopathies (AIR). We present the indirect immunofluorescence data from a series of suspected AIR patients and controls.
Methods Primate retinal sections were incubated with 1:100 diluted sera. Patients with suspected paraneoplasic AIR (pAIR) (n=13) or non paraneoplasic AIR (npAIR) (n= 15) were included. Diagnosis of AIR was based on a combination of symptoms (visual loss, photopsia, nyctalopia) and signs (decreased visual acuity, reduced visual field, abnormal electroretinography and retinal imaging) in a context of history of cancer or autoimmune disease. 3 control groups were used to define the threshold of positivity: negative: sera from healthy individuals without ophthalmological history (n=15), pathological: patients with outer retinal inflammation (ORI) (n=12) and positive: commercial antibodies against recoverin, α-enolase, IRBP and TRPM-1. Antinuclear antibodies (ANA) were screened when a nuclear pattern was observed.
Results As expected, in sera positive for ANA there was a signal in all nuclear layers, complicating ARA interpretation. ANA positivity was found in 4/15 negative controls, 2/12 ORI, 2/13 pAIR, 7/15 npAIR. In ORI, 1/12 patient had positive ARA. We found ARA respectively in 6/13 pAIR and 4/15 npAIR patients. ARA were localized at the following retinal layers: photoreceptors (PR), external limiting membrane, outer plexiform layer, outer nuclear layer. In pAIR, PR staining was most frequently observed. In contrast, no predominant location was found in npAIR.
Conclusions We show that ARA detection can help the management of suspected AIR patients but should be integrated in the overall clinical context. Furthermore, we underline the importance of using negative controls and being aware that positive ANA complicate interpretation of results.

• 3374

Evaluation of Tumor Necrosis Factor inhibitor therapy in Susac syndrome

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Purpose To analyze the effect of tumor necrosis factor inhibitor therapy on ocular relapses in patients with Susac syndrome.
Methods Multicenter retrospective case series of patients with ocular Susac syndrome treated with a TNF inhibitor (either infliximab or adalimumab). Diagnosis was based on neurologic, ophthalmic, otologic, biologic and imaging typical findings.
Results Five patients were included. All were initially treated with a combination of corticosteroids and classical immunosuppressive drugs. In 4 of the 5 patients a TNF-inhibitor (3 infliximab and 2 adalimumab) was started due to treatment failure. In these patients cortisone could not be decreased below a daily dose of 10 mg without the occurrence of relapses (with an average of 4.25 relapses over a mean follow-up of 330 days) despite the use of a mean of 2.75 different immunosuppressive drugs. After introduction of an anti-TNF agent the daily cortisone dose could successfully be tapered below 10mg in all patients with a complete stop in 3 patients, with a mean number of 1.25 relapses during a mean follow-up of 1199 days. In the fifth patient, disease activity was well controlled with only steroid sparing immunosuppressive agents and only 1 relapse during approximately 5 years of follow up until these had to be stopped for a desired pregnancy. No relapse was documented during 60 weeks of follow-up while on infliximab treatment afterwards.
Conclusions Anti-TNF antibodies can be a valuable option for the treatment of ocular Susac syndrome and may especially be considered in those patients unresponsive to conventional immunosuppressive treatment.

Conflict of interest
Any research or educational support conditional or unconditional provided to you or your department in the past or present?:
Educational support for one of the co-authors.
Any financial support like travel accomodation hospitality etc provided to you or a member of your staff or an accompanying person?:
Financial support for travel accomodation for one of the co-authors.

• 3375

In vitro evaluation of anti HSV-1 siRNAs and in vivo evaluation of electroporation to transfect siRNAs on murine cornea

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Purpose HSV-1 keratitis (HSK) is a leading cause of infectious blindness in developed countries. Massive use of nucleosidic DNA polymerase inhibitors, used as curative or prophylactic treatments, may favor the emergence of resistance. Anti-HSV1 small interfering RNAs (siRNA) may be efficient to overcome this issue, but their transfection into corneal cells remains a challenge. The purpose of this study was to assess the in vitro efficacy of siRNA targeting HSV-1 DNA polymerase to reduce HSV-1 replication, and the in vivo efficacy of electroporation to transfect siRNA into corneal cells on the murine cornea.
Methods Three different anti HSV-1 DNA polymerase siRNAs (S1-S3) and one control siRNA were transfected into vero cells using cationic lipids, which were secondarily infected with the SC16 strain of HSV-1. Efficacy on viral replication was assessed using flow cytometry, quantitative PCR (qPCR) and plaque assay technique. On murine cornea, fluorescent siRNAs were injected subconjunctivally and electroporation was performed with custom made electrodes applied on the conjunctiva. The eyes were enucleated, and observed under fluorescence microscopy.
Results The three siRNAs were able to inhibit viral replication. Compared to the control siRNA, S3 was the most efficient siRNA, decreasing by 60% the number of infected cells as measured with flow cytometry, by 59% the number of plaques and by 75% the viral load estimated with qPCR. Electroporation improved siRNA penetration into the corneal epithelium compared to subconjunctival injection alone.
Conclusions These results demonstrate that siRNA directed against HSV-1 DNA polymerase efficiently inhibits HSV-1 replication, suggesting that siRNA based antiviral strategy may be a potential therapeutic alternative to treat HSK. Besides, intracorneal penetration may be facilitated by electroporation.

• 3381

Investigating the effect of low dose ionising radiation on epithelial progenitor cell niches

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Recent work has identified a nonlinear biological response to low dose radiation in support of the low dose hormesis model in the murine lens epithelium, with mice being irradiated with doses between 0.1Gy and 1Gy, with the dose response peaking at 0.5Gy (Markiewicz et al., 2015). An important question is whether other epithelia show similar low dose hormetic responses and whether there are any associated pathologies. These comparative studies will help us understand how low dose IR causes cataract. We have developed a conical gel mount system on glass microscopy slides for the mouse lens, which allows its placement and manipulation using a standard inverted confocal microscope. Each lens was subsequently imaged with the Leica SP5 confocal microscope through a set of sequential z stacks, and reconstructed in ImageJ to produce the 3D anaglyphs to measure cell density, cell proliferation and cell apoptosis events in the lens epithelium. By comparison, conventional histochemistry was sufficient to make similar measurements for the progenitor cell niches in the hair follicle and colonic crypts and therefore to determine whether there is a common or distinct hermetic response by the lens epithelium to low dose ionizing radiation.

• 3382

Lifetime Study in mice: 24 months follow up after low doses of ionizing radiation with Scheimpflug imaging and OCT

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At the adult age of 10 weeks male and female hybrid mice (C57BL/6 x C3H F1) were acutely whole-body irradiated with low doses of ionising radiation (0, 0.063, 0.125 and 0.5 Gy) using a 60Co source. Over the following 24 months the mice were examined monthly for lens opacities by Scheimpflug imaging and every four months for retinal effects by OCT (optical coherence tomography). To estimate the contribution of genetic effects, virtually healthy mice heterozygous for an *Ercc2* mutation were compared to wild-type mice of the same strain background.
Additional groups of mice were sacrificed at various time points (4 and 24 hours, 12, 18 and 24 months after irradiation) to investigate the underlying mechanisms of radiation-induced effects on the eye and other organs. Histological and immunohistochemical analysis of the eyes are done.
Even at the highest dose of 0.5 Gy, analysis of the Scheimpflug examinations in irradiated wild-type mice did not show significant differences in lens opacity compared to the unirradiated control group or the heterozygous mutants up to 24 months after irradiation. OCT data showed a reduction of the retinal thickness in irradiated heterozygous mutants, but not in wild-type mice.

• 3383

Epidemiological needs to support lens mechanistic research

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Abstract not provided

• 3511
Prevention of retinal detachment

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Rhegmatogenous retinal detachment (RRD) is usually caused by peripheral retinal breaks related to anomalous posterior vitreous detachment (PVD). A smaller percentage is caused by atrophic retinal holes or traumatic dialysis of the ora serrata in the absence of a PVD. Although RRD affects only a small percentage of the general population, it can cause significant vision loss. A 5-10% of retinal reattachment attempts may fail whereas only half of the eyes with reattached retinas will maintain ≥ 20/50 vision. Furthermore, RRD repair harbours complications such as endophthalmitis, cataracts and diplopia. Prevention of RRD is therefore important. In this course we will explore the risk factors predisposing to RRD and will discuss preventive measures.

• 3512
Pseudophakic retinal detachment

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Pars plana vitrectomy alone or combined with scleral buckling and scleral buckling are effective methods for repairing pseudophakic retinal detachments (PRDs). The currently available literature points to no compelling difference in single surgery or final anatomic success rates between those techniques.
The considerable improvements of the vitrectomy tools have created an increasing interest for their use as an initial procedure for the management of (PRDs). There is little evidence to support the routine addition of a scleral buckle to pars plana vitrectomy. Combined vitrectomy and scleral buckle results to an added operative time, greater postoperative (and sometimes intraoperative) discomfort, the induced refractive error and the potential for other buckle-related complications.
Pars plana vitrectomy alone, allows the avoidance of complications associated with scleral buckles and at this time seems to be the procedure of choice for pseudophakic retinal detachment.

• 3513
Myopic Retinal detachment

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Half non traumatic retinal detachment (RD) happens in
myopic eyes with a ten folds risk in eyes over three diopters. Most of RD are related with an atrophic round hole or a horseshoe tear in the periphery. Retinal detachments in highly myopic eyes are characterized by the location of the breaks posteriorly to the equator, the presence of para vascular breaks,or the presence of posterior pole RD without break associated with staphyloma or foveoschisis. Treatment of RD is challenging because of the difficulty of placing a posterior buckle, the increased risk of anterior segment ischemia and a higher risk of PVR in case of relapse. Most of patients are treated by primary vitrectomy with the use of dye or triamcinolone to facilitate visualization of posterior hyaloid during cortical vitreous peeling. The primary success rate ranges between 75 to 90% after single procedure using gas tamponnade. Encircling band, macular buckling, or silicone oil are only used if a second procedure is needed.

• 3514
Diabetic Retinal detachment

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Abstract not provided

• 3515

Retinal detachment in ocular oncology

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Retinal detachment may occur in advanced retinoblastoma or be induced by recent therapy as intra-arterial chemotherapy.
First line intra-arterial chemotherapy was proposed recently as a new conservative treatment for retinoblastoma patients. It offers good tumor control. Incidence of rhegmatogenous retinal detachment will be detailled as the evolution over time. Treatment options will be discussed, including scleral buckle surgery and surgical outcome. In our recent serie, secondary retinal detachment occurred in 16/30 cases (50%). Scleral buckle surgery with anterior chamber ponction was performed without drainage of sub-retinal fluid. Retinal reapplication was obtained with scleral buckling in all patients. The early treatment of this complication is important for salvage of the globe and visual function.

• 3521

Autophagy and ageing in the retina

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Abstract not provided

• 3522

Repairing the ageing brain - neural ECM in regeneration and rehabilitation

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Perineuronal nets (PNNs) are meshed-like extracellular matrix structures present on the surface of sub-populations of neurons and are involved in regulating plasticity in the central nervous system (CNS). PNNs are formed at the end of the critical period during development and their formation closes the critical period for plasticity, as demonstrated in ocular dominance plasticity. One of the major components of PNNs are chondroitin sulphate proteoglycans (CSPGs), a family of inhibitory molecules for neuronal growth and regeneration. CSPGs are highly up-regulated after injury in the CNS, including spinal cord and optic nerve. Enzymatic removal of CSPGs in the PNNs enhances plasticity, allows re-organisation of circuitry and improves functional recovery. Recently, we also observed specific changes in chondroitin sulphate composition in ageing brains when compared to young adult brains. This change may underlie the loss of plasticity in ageing animals. We shall discuss the role of PNNs in regulating plasticity, regeneration and rehabilitation in the CNS, including the visual system in this talk.

• 3523

Gene transfer of E2F2 induces in situ regeneration of retinal pigment epithelium

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The retinal pigment epithelium (RPE) interacts closely with photoreceptors and is important for maintaining visual function. In degenerative diseases such as age-related macular degeneration (AMD), the leading cause of blindness in the developed world, RPE cell loss is followed by photoreceptor cell death. RPE cells can proliferate under certain conditions, suggesting an intrinsic regenerative potential, but so far this has not been utilised therapeutically. Here we use ***E2F2***, a potent transcriptional regulator of cell proliferation, to induce RPE regeneration ***in vitro*** and ***in vivo.*** Gene transfer of ***E2F2*** induced upregulation of Ki67 and uptake of BrdU in growth arrested ARP19 cells ***in vitro.*** In both, young and old C57Bl/6 mice, subretinal lentiviral delivery of E2F2 to the RPE caused a 40-fold ±27.2 increase in E2F2 positive RPE cells that correlated with a 10-fold ±4.7 increase in BrdU positive cells and a mean increase of RPE cell density. E2F2 also induced BrdU uptake and increased cell density in the central RPE of RPECreER/DTA mice, where pathology, induced by the activationof diphtheria toxin-A, was strongest. These results provide proof of concept for a strategy to treat progressive RPE cell loss by in situ regeneration.

Conflict of interest
Any post or position you hold or held paid or unpaid:
The author U. F. O. Luhmann is an employee of F. Hoffmann-La Roche. Ltd.

• 3524

Stem cells in reparing optic nerve damage

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Modelling Leber's Hereditary Optic neuropathy using human induced pluripotent stem cells.
Human induced pluripotent stem cells (iPSCs) provide an invaluable tool for disease modelling in vitro. Here, we report the generation of iPSCs from LHON patients, their differentiation to retinal ganglion cells (RGCs) for subsequent modelling of phenotypic abnormalities. We also report the manipulation of mitochondrial DNA to correct LHON iPSCs by generation of cybrids. Comparison of LHON iPSCs and their isogenic cybrid control provide novel information on the potential cellular mechanisms leading to RGC death observed in human patients.

• 3525

Retina proteomics provide new insights in glaucoma

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Proteomic alterations have been studied in retina samples of glaucoma and non-glaucoma control donor eyes (*N*=5/group) by use of a bottom up proteomic platform implementing LC ESI LTQ Orbitrap XL MS analysis and label-free quantification following functional analysis using gene ontology (GO) annotation. Furthermore, candidate abundances were examined in porcine retina and optic nerve head preparations (*N*=12/tissue type). Approximately 10% of identified proteins (>600, FDR<1%) showed significant level alteration ($p<0.05$) or distinct tendencies in glaucomatous retinae, predominantly encircling mitochondrial and nucleus residing proteins. Thereby, new candidates, e.g. ADP/ATP translocase 3 and methyl-CpG-binding protein 2 could be proposed to be associated to glaucoma. Numerous candidates, e.g. retinol-binding protein 3 show characteristic distribution of abundance comparing optic nerve head and retina proteomes in porcine model eyes ($p<0.05$). In conclusion, distinct proteomic alterations could be documented in the human glaucomatous retina highlighting new retinal protein candidates. Moreover, characteristic distribution of ocular proteins and candidates could be revealed.

• 3531

Presence of proteinase inhibitor-9 and granzyme B in healthy and pathological human corneas

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Aim: To determine whether proteinase inhibitor-9 (PI-9) and granzyme B (GrB) are expressed in normal and pathological corneas.
Methods: Cryosections and endothelial, epithelial and conjunctival imprints of 12 human cadaverous corneo-scleral discs and 13 pathological corneas (corneal melting and herpes virus keratitis) were used. Protein localization was examined using fluorescent and enzymatic immunohistochemistry, and mRNA expression was determined by qRT-PCR.
Results: PI-9 is predominantly expressed in the superficial and suprabasal epithelial layers of the cornea and conjunctiva. The corneal endothelium showed positivity in about 50% of cells. GrB was weakly present in healthy corneal epithelium and endothelium. The expression of both proteins was confirmed using qRT-PCR. Besides altered expression in pathological corneas, strong positivity for PI-9 and GrB was present in stromal infiltrates and some stromal cells that were positive for HLA-DR and CD45. A marker typical of keratocytes, CD34, was decreased or totally absent in pathological infiltrates.
Conclusions: The changes of PI-9 and GrB expression in pathological tissue indicate that these proteins participate in the corneal immune response during the inflammatory process.

• 3532

Transduction of corneal endothelial cells with AAV2 vectors

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This talk deals with transduction of corneal endothelial cells with different kinds of AAV2 vectors. Data of a human corneal endothelial cell line as well as of human donor cornea endothelium will be presented. Furthermore, ways of optimizing transduction efficiency and feasibility of AAV2-mediated gene therapy will be discussed.

• 3533

Agonistic β2 receptor autoantibodies in ocular hypertension and open-angle glaucoma

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Pathogenesis of glaucoma, a leading cause of blindness, is widely unknown till now. An involvement of immunological processes is discussed. Agonistic autoantibodies against β2-adrenergic receptor autoantibodies (β2-AABs) were found in a high rate of 69% in sera of glaucoma suspects and 78% in glaucoma patients, yet not in normals. β2-AABs were of subclass type IgG3, interacting with the second extracellular loop of ß2-adrenergic receptor. Immunadsorption of AABs in 5 patients with primary open-angle glaucoma resulted in a transient reduction of intraocular pressure. As β2-AABs are involved in the regulation of aqueous humor dynamics and show a strong correlation with retinal capillary flow, a potential influence of β2-AABs on retinal microcirculation and involvement in the pathogenesis of glaucoma is suggested.

• 3534

Automated intravitreal injection system for the efficient treatment of AMD

ULLRICH F
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Intravitreal therapy is the most common treatment for many ophthalmic diseases, such as age-related macular degeneration or diabetic retinopathy. To render this procedure time and cost efficient, as well as to increase patient safety, an automated assistive device for intravitreal injections has been designed and is introduced in this talk. The system allows for precise and safe injections through the pars plana but is still controlled and monitored by the treating physician.

Conflict of interest
Any post or position you hold or held paid or unpaid:
CEO, Ophthorobotics AG

• 3535

Ocular drug delivery with cyclodextrin nanoparticles: Anterior segment advantages and posterior segm

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Abstract not provided

• 3541

Topical chemotherapy for pigmented and epithelial tumors of the conjunctiva

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Topical chemotherapy drops are very useful in the treatment of conjunctival malignancies. Mitomycine drops can be used for in situ squamous cells carcinomas. We use the 0,02% as an adjuvant therapy when the carcinoma has been surgically removed and (15 days treatment, stop 15 days and again 15 days of treatment) 0,04% drops if there is incomplete removal of the tumor. In some rare instances, mitomycine drops can be used to reduce the tumor volume for invasive squamous cells carcinoma before surgery. Mitomycine 0,04% is also very useful in the treatment of primary acquired melanosis. (cycles of 8 days or 15 days according to local tolerance) We limit the use of such a treatment to patients who have atypical cells or have already developed a previous malignant melanoma. Toxicity of mitomycin drops on the cornea is higher with the 0,04% drops and careful follow up is warranted. Drops of interferon alpha can also be used. They are less toxic but the treatment needs to be applied several months and the cost is higher.

• 3542

Neovascular glaucoma. Prevention and treatment with intravitreal anti-VEGF's in ocular oncology

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Abstract not provided

• 3543

Irradiation induced maculopathy. Pathogenesis and therapeutic approach with anti-VEGF's

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Irradiation induced maculopathy is a major complication following conservative management of uveal melanomas with brachytherapy or proton beam irradiation. It occurs generally 1.5 to 3 years following treatment. An early attempt (6 months) or a late occurance (8 years or more) is also possible. Functional loss depends to the irradiation dose as well as the presence of predisposing risk factors (diabetic retinopathy, previous serous retinal detachment of the macula with attempt of the outer retina). Fluoresceine angiography, OCT-A, OCT en face and B-mode OCT are the imagine techniques used in order to quantify the anatomic damage. These examinations allow to observe the modifications of the inner and outer perifoveal capillary network and to quantify the extend of the cystoid macular edema. Visual function is mainly correlated with the damages of the deep capillary plexus observed in the OCT-A. A therapeutic approach with anti-VEGF's can be considered in all the cases with minimal or mild damage of the deep capillary plexus.

• 3544

Intravitreal pharmacotherapy of CME related to conservative management of uveal melanomas

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Eye salvaging treatment of uveal melanomas are commonly associated with the development of cystoid macular edema. The extend and severity of this complication is associated with the size and location of the tumour treated. Tumours that are located closer to the fovea and are larger in size bear a higher risk of developing CME. Different treatment strategies have been employed to address this issue. Laser coagulation of the ischemic retinal areas, surgical removal of the initiating tumour, and more recently pharmacological concepts either by anti-VEGF agents, or by intravitreal steroid applications have been proposed as potential treatment options for this problem.

Conflict of interest
Any consultancy arrangements or agreements:
Novartis
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Any financial support like travel accomodation hospitality etc provided to you or a member of your staff or an accompanying person:
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Novartis, Alcon, Hoya, Bayer

• 3545

Intravitreal chemotherapy for intraocular lymphomas

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The treatment of intra ocular lymphoma with methotrexate is currently used since a decade. The local treatment is effective but often suspensive. The most common dosage is 400 microg/0.1 ml twice a week for 4 weeks then once a week for 4 weeks then once a month. This treatment is not easy to monitor since there is no measurable mass into the eye. One option is to monitor the tumor response with the help of IL10 dosage in the anterior chamber regularly. The IL10 decrease is very well correlated to the decrease of tumoral cells into the eye. The controversy that remains is when to use this local treatment? Is it sufficient if the lymphoma is restricted to the eye? Or should we need to treat systemically the ocular involvement before the occurrence of cerebral tumor? If the patient is treated systemically but relapse only in the eye, the local treatment is a good option. To date there is no evidence based studies demonstrating that ocular lymphoma is better treated systemically or locally and this point remains controversial.

• 3546

Retinal toxicity following intra-vitreal injections of melphalan

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We report a retinal toxicity grading system as observed in a cohort of 110 retinoblastoma eyes treated by intra-vitreal injections of melphalan to control vitreous seeding.
By definition grade 1 and 2 correspond to a salt and pepper retinopathy anterior to the equator of
2 quadrants and
2 quadrants respectively; grade 3 any extension behind the equator, grade 4 extension involving the macula and grade 5 diffuse retinopathy with optic nerve atrophy. In our series grade 4 and 5 toxicity could be avoided in 100% of the cases. We conclude that our injection technique is safe enough to prevent severe sight-threatening toxicity.

• 3561

Flash adaptometry in congenital stationary night blindness

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Purpose To demonstrate that flash adaptometry, in x-linked congenital stationary night blindness with myopia, besides quantification of reduced light sensitivity, renders a proof of deviating temporal resolution.
Methods The flash adaptometer realizes light stimuli of various intensities by variation of exposure times. Stimuli of low luminance can be created by ultrashort flashes down to 0,002 mcds/m2. Following a 5 min pre-adaptation (320 cd/m2), slow flicker stimuli are presented in darkness at a repetition rate of 6,7 Hz. The flashes illuminate a Ganzfeld sphere and a Gabor sine wave grating. Thresholds are determined for i) detection of the Ganzfeld flashes, and ii) recognition of the directional orientation of the grating.
Results After 20 min of dark adaptation, the detection threshold for Ganzfeld flashes of young (22 - 24 yr) normal subjects amounts to 0,004 mcds/m2, the recognition threshold for grating orientation to 0,008 mcds/m2. 4 more decades of age reduce light and grating sensitivity in normal observers by 0,6 – 0,9 log units. The CSNB observer (66 yr) featured a reduced ganzfeld detection threshold of 1,0 mcds/m2. He experienced, however, the train of flashes of 1,0 and 2,0 mcds/m2 as continuous illumination. At 4 mcds/m2, he was able to recognize temporal contrast i.e. flicker, and spatial contrast i.e. grating orientation.
Conclusions With flash adaptometry, in x-linked CSNB, besides reduced light sensitivity, an anomaly of temporal resolution was found. Understanding the mechanism of this particular behavior deserves further consideration.

Conflict of interest
COI only for Matthias Mai

• 3562

Comparison of perceptual eye positions among patients with different degrees of anisometropia

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Purpose To compare the perceptual eye positions among patients with different degrees of anisometropia.
Methods 157 patients were recruited and devided into 3 groups according to the spherical equivalent (SE) difference between two eyes: group A with anisometropia>2.50D, group B with anisometropia>1.00D and ≤2.50D, group C with anisometropia ≤1.00D. The degree of refractive errors in presence of astigmatism was converted into the degree of spherical equivalent. We compared the vertical and horizontal perceptual eye positions among the three groups, using polarized monitor and three-dimension (3D) polarized glasses. The results were recorded and statistically analyzed by SPSS19.0.
Results Group A included 32 patients, aged (14.51±9.50) years old; group B included 37 patients, aged (15.52±9.61) years old; group C included 88 patients, aged (15.03±9.73) years old. There was no significant difference in age among the three groups. The SE differences between two eyes were as follows: group A (5.04±2.92) D, group B (1.48±0.40) D, group C (0.31±0.28) D. The average vertical perceptual eye position pixels were (13.84±13.87) in group A, (6.51±7.19) in group B and (7.60±9.26) in group C. There were significant differences between group A and group B ($P<0.05$), group A and group C ($P<0.05$), while no significant difference between group B and group C ($P>0.05$). The average horizontal perceptual eye position pixels were (62.78±94.81) in group A, (42.37±55.96) in group B and (47.90±56.18) in group C. There was no significant difference among the three groups ($P>0.05$).
Conclusions There was obvious deviation in vertical perceptual eye position in patients with anisometropia>2.50D, indicating that the unstability of vertical perceptual eye position might be a critical factor for the development of anisometropia.

• 3563

Retinal microcysts associated with optic atrophy in children - visual electrophysiology studies

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Purpose Retinal microcysts have been described in adults with chronic or advanced optic atrophy of different aetiologies. We report microcysts in 4 children with visual electrophysiological evidence of optic atrophy.
Methods Visual electrophysiological investigation of 4 children with unexplained poor vision was carried out using flash and pattern ERGs and VEPs. SPECTRALIS® OCT images were taken. Case 1 aged 12yrs logMAR VA 0.3, 0.5 was referred to investigate a suspected maculopathy as Ishihara colour vision was also reduced. The discs were described as full and consistent with bilateral drusen. Case 2 aged 4 yrs LogMAR VA 0.8 R&L had presented in infancy with a strabismus, and had been patched with no improvement. His hearing was also being investigated. Case 3 aged 16yrs LogMAR VA BEO 0.54 R&L, was born prematurely, 32/40 weeks, and his discs were described as slightly small. Case 4 LogMAR VA 0.24, 0.1 diagnosed with ADHD presented aged 12yrs with headaches. His discs were described as 'unusual.'
Results In all cases flash ERG b: a amplitude ratios were normal, whilst pattern and flash VEPs showed marked dysfunction of macular and generalised pathways. PERG N95 components were subnormal in two cases tested. In all cases RNFL was thinned and OCT showed schitic changes in the inner nuclear layer of the maculae. The markedly abnormal pVEP and fVEPs contrasted with the preserved foveal architecture and indicated schisis was not a primary cause of poor vision. MRI scans were normal in cases 1-3 and genetic results for DOA and mitochondrial disorders are awaited. Case 4 has a heterozygous mutation of FGFR2.
Conclusions Our findings show that retinal microcysts associated with optic atrophy can occur as early as 4 years of age and highlight the value of visual electrophysiology in the differential diagnosis of subnormal vision of children.

• 3564

Comparison of multifocal pattern ERG responses to luminance and chromatic contrast stimulations

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Purpose To evaluate the relationship between ganglion cells properties and responses obtained with multifocal pattern ERG.
Methods 6 normal subjects were tested with 3 types of multifocal ERG stimulations: standard flash, pattern reversal with luminance contrast (black / white) and pattern reversal with chromatic contrast (red / green). The amplitude density and implicit times (ms) of responses were evaluated as a function of eccentricity with respect to fixation.
Results The amplitude density of responses was much smaller for pattern reversal stimulations than for flash stimulations with a ratio of 2.5 at the fovea (57 nV/deg2 versus 146 nV/deg2) and 13 at 15 degrees of eccentricity (3.2 nV/deg2 versus 43 nV/deg2). The responses to chromatic contrast were significantly delayed in comparison with luminance contrast.
Conclusions The variation of amplitude density of multifocal ERG responses with eccentricity was found similar to the variation in density of photoreceptors for flash stimulations and of ganglion cells for pattern stimulations.

Conflict of interest
Any Stocks or shares held by you or an immediate relative?:
owner of shares in Metrovision's company

• 3565

A new electroretinogram function that can move the centre of the multifocal hexagonal stimulus array

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Purpose We can examine declines in visual sensitivity at arbitrary points on the retina using a precise perimetry device with a fundus camera function. However, the retinal layer causing the decline in visual sensitivity can not be identified. To investigate cryptogenic diseases, such as macular dystrophy, acute zonal occult outer retinopathy and multiple evanescent white dot syndrome, we studied a new electroretinogram function that can move the centre of the multifocal hexagonal stimulus array.
Methods An electroretinographic optical system, specifically perimetric optical system, was added to an experimental device with the same optical system as a fundus camera. We also added an Edmund infrared camera EO-0413, a lens with a focal length of 25 mm, a 45-degree cold mirror, a halogen lamp and an 8-inch monitor. Software was generated to show the multifocal hexagonal stimulus array on the monitor using C++Builder XE8 and to move the centre of the array up and down as well as back and forth. We used National Instruments' USB-6008 and their system design platform LabVIEW 2015 for data retrieval. The Nihon Kohden plate electrode NE-113As were used to measure electrodermal activities around the eyes. Some contact lens electrodes were used to measure electrical potentials of retina.
Results We used a multifocal hexagonal stimulus array with 37 elements in the software. The centre of the multifocal hexagonal stimulus array could be adjusted to the same position as the examination target of the precise perimetry.
Conclusions We successfully added this new electroretinogram function to the experimental ophthalmologic device.

• 3566

Analysis of macular sensitivity using multifocal electroretinogram and microperimetry in Central Serous Chorioretinopathy patients after half-dose photodynamic therapy

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Purpose To evaluate macular functional changes using multifocal electroretinography and microperimetry after half-dose photodynamic therapy with verteporfin (HD-PDT) in acute and chronic central serous chorioretinopathy (CSC) patients
Methods The charts of 101 CSC patients submitted to half-dose PDT were reviewed. A total of 117 eyes with acute or chronic CSC underwent half-dose PDT using 3mg/m2 verteporfin infused over 10 minutes. Serial recordings of BCVA using the ETDRS charts, macular thickness using OCT and retinal sensitivity using both microperimetry (MP) and mfERG were performed at baseline and at 3, 6, 12, 18, 24, 36, 48, 60 and 72 months after treatment. A longitudinal assessment for each of these parameters and a Spearmen's correlation analysis between them was performed.
Results Compared to baseline, a significant increase in N1, P1 and N2 mean amplitudes was registered after HD-PDT, as well as a significant decrease in N1, P1 and N2 mean implicit times, both for central and peripheral rings. A correlation analysis showed significant correlations between BCVA and the first-order component of retinal response for the most central ring (<2 degrees). Significant correlations were also found between P1 implicit time and mean central macular thickness both at 36 (P=0.030) and 72 months (P=0.037). Central 4 degrees retinal sensitivity significantly correlated with N1 amplitude ratio at 72 months (P<0.01) and P1 implicit time differences at 6 (P=0.013) and 12 months (P=0.014).
Conclusions mfERG demonstrated an increased retinal sensitivity in PDT-treated CSC patients. Changes in BCVA, central macular thickness and central retinal sensitivity significantly correlated with the mfERG responses. HD PDT treatment improved both structural and functional outcomes and mfERG is an important objective parameter to evaluate functional changes in follow-up.

• 3567

Systematic assessment of clinical methods to diagnose and monitor diabetic retinal neuropathy

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Purpose Background and Purpose:
Diabetic retinal neuropathy refers to retinal neural tissue damage occurring before diabetic retinopathy and fulfils many of the criteria for causality for the subsequent vasculopathy. Developing reliable means of measuring neuronal damage in diabetes may be important in efforts to prevent retinopathy. This study aimed to systematically assess current clinical measurements of diabetic retinal neuropathy.
Methods Methods: A systematic search of the medical literature since 1984 was performed on PUBMED and EMBASE and the evidence supporting each identified method as an indicator for clinically important diabetic retinal neuropathy was graded relatively as strong, medium or weak according to criteria assessing its relationship to subsequent diabetic retinopathy, quality of supporting studies and published reproducibility.
Results Results: The systematic search yielded 6421 results. Subsequent assessment by two independent investigators identified 601 multiple subject studies in humans assessing clinical aspects of retinal structure, function or psychophysics in the pre-diabetic retina. Clinical methods assessed as being supported by relatively "strong" evidence included FM-100 hue colour vision changes, flash ERG b-wave latency, flash multifocal b-wave latency, scotopic flash ERG oscillatory potential amplitude and contrast sensitivity.
Conclusions Conclusions/Discussions: The results showed moderately poor quality of extant evidence and indicate the best clinical methods for assessing diabetic retinal neuropathy remain to be confirmed. This is the first systematic assessment of the medical literature aiming to assess the breadth and validity of these methods and represents an early step in identifying and developing endpoints for use in trials designed to identify at risk patients or prevent diabetic retinopathy.

• 3571

What do we need as author, editor and publisher?

DUA HS
Queens Medical Centre, Derby Road, Eye Ear Nose Throat Centre

Abstract not provided

• 3572

Essentials of a good article

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The intrinsic quality of a scientific article depends first and foremost on its scientific content. However, the way in which the scientific material is presented and the paper is written may determine whether the scientific content will ever receive the attention it deserves. There may not be any perfect recipe for a perfect paper, but it is possible to point out some general characteristics of good papers, and we will try to do so. Our guidance is based on convention and personal preference, reflecting our experience as authors, reviewers and editors. We hope our advice will be useful, especially to those who are starting to write scientific papers.

• 3573

How to keep your work published?

KIVELA T
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If you want to keep your papers published, please avoid at least the following five mortal academic sins. 1. Do not plagiarize either the work of someone else or your previous writings. Be original to succeed. 2. Do not revert to sloppy, let alone dishonest research practice. Eventually you will be discovered. 3. Do not manipulate any images. There are people specialized to discover and report this type of a problem. 4. Do not meddle with authorship. Everyone involved is to be included and should know about it. 5. Do not fake peer review. Yes, it does happen. These and other great ways of getting your paper pulled out of the literature will be highlighted in this talk using recent life examples, several of them from the field of ophthalmic research. Moreover, the audience will be introduced to useful tools related to post-publication review, an important emerging trend that you can be part of. Learn what problems are best to know before they will strike you either through your own action or through that of one of your co-authors.

• 3574

The review process - Reviewer friend or foe?

PLEYER U
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All - authors, reviewers, editors and publishers and reader - play their role in scientific publishing. Since the peer review system still is the dominant component of scientific publishing, editor and reviewer are key players in the manuscript processing system. The role of the reviewer is well defined and critical for the selection process. She/he is committed to support the editor`s decision and selection which manuscript is suitable for publication – and which is not…..

Since the number of manuscript submissions continues to grow, the quality of the peer-review process are the key to support the journal´s reputation and its standing in the field.This presentation will not only focus on the role of the reviewer, but also raise the question how to become an active member of the peer-review process.

• 3581

Molecular study of the MFRP gene in patients with posterior microphthalmia (MCOP) supports its role in autosomal recessive MCOP pathogenesis

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Purpose Posterior microphthalmia(MCOP) is a rare developmental disease restricted to the posterior segment of the eye.To date,mutations in the MFRP gene,encoding a frizzled-related protein, reported in autosomal recessive MCOP (arMCOP).Here,we aimed to identify the genetic cause of arMCOP in seven patients from different ethnicity.
Methods All patients underwent detailed ophthalmological evaluations and Sanger sequencing of the of MFRP (NM_031433.2). Two patients originating from a consanguineous marriage underwent homozygosity mapping using SNP arrays.
Results MFRP was found in a homozygous region of 10.2 and 6.2 Mb in two patients respectively. Overall,eight distinct MFRP mutations were found in the patients studied.Five patients were homozygous for:two missense variants with predicted pathogenic effect (c.1231T>C, novel;c.1549C>T,known) and three frameshift mutations (c.1090_1094del,novel; c.498del and c.498dup,known). Moreover,a sixth patient was compound heterozygous for a nonsense mutation (c.955C>T,novel) and novel deletion of 6,2 kb (c.16088_54+40delinsA),predicted to abolish the transcription initiation site. The seventh patient was heterozygous for a known frameshift mutation (c.491_492insT),no second mutation was found so far.All patients had short axial length (13-16.5 mm),reduced visual acuity (0.15-0.8 logMAR) and hyperopia (+13D to +17.25D).Crowded optic discs were noticed in 7/7 and macular folds in 3/7 patients. Optical coherence tomography showed intraretinal cysts in 5/7 patients. Peripheral pigmentary changes were observed in 5/7 patients.
Conclusions Eight distinct MFRP mutations four of which novel and the first report of a genomic rearrangement. No clear genotype-phenotype correlations could be observed. This identification might offer opportunities for potential gene-based therapies suggested by Dinculescu et al (2012).

• 3582

Phenotype of maculopathy in primary hyperoxaluria type 1

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Purpose To describe the structural and functional characteristics of oxalate retinopathy, an entity described in only 40 cases until now.
Methods Five patients with molecularly confirmed primary hyperoxaluria type 1 were subjected to multimodal retinal imaging (spectral-domain optical coherence tomography, white light, and HRA multispectral imaging) and functional testing, including color vision testing, Goldmann perimetry, and ISCEV standard electrophysiological testing.
Results One patient with a c.[33dupC]; c.[731T>C] mutation showed bilateral perifoveal retinal pigment epithelium hyperplasia. The fundus in the four other patients, all of whom share an identical homozygous c.[33dupC] mutation, ranged from normal to bilateral widespread distribution of retinal crystals and confluent macular retinal pigment epithelium hyperplasia with subfoveal fibrosis. All patients who had developed end-stage renal disease showed some sign of retinopathy, more severe with earlier onset.
Conclusions Retinopathy in primary hyperoxaluria type 1 shows considerable interindividual variation. No correlation between genotype and retinal phenotype was detected. A proposed clinical grading system of oxalate maculopathy derived from a literature review may help clinicians in estimating not only current visual function but also prognosis in this patient population that largely consists of preverbal infants.

• 3583

Molecular mechanisms of X-linked retinitis pigmentosa

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Purpose Retinitis Pigmentosa is a class of inherited retinal degeneration that causes progressive vision impairment even blindness. The mutations of Retinitis Pigmentosa GTPase Regulator (RPGR) gene account for up to 20% of RP cases. RPGR protein is highly expressed at the connecting cilium of vertebrates' photoreceptors. RPGR protein has the function of regulating protein trafficking from basal body to axoneme. The trafficking is controlled by the protein complex formed by RPGR, RPGRIP1 and IFT proteins, although its precise function yet to be identified. RPGR-/- mice model was employed for investigating disease mechanisms during retinal degeneration.
Methods cell death pathway and protein trafficking were detected by immunohistochemistry.
Results The retina of RPGR-/- mice started to undergo degeneration from 3M old. The caspase dependent cell death pathway was found to be activated during degeneration. The Apoptosis Inducing Factor existed in outer nuclear layer indicated that caspase-independent apoptosis also contributed to cell death. The activated microglia, showed migration from outer plexiform layer to ONL in the retina of RPGR-/- mice and the downstream inflammation pathway were activated in RPGR-/- retina. Prior to the onset of retinal degeneration, the key elements involved in the phototransduction such as rhodopsin already mislocalized and accumulated in inner segment and outer nuclear layer. The mislocalization may result from the abnormal formation of the regulator of membrane trafficking Rab8 in RPGR-/- mice that controls the fusion of rhodopsin transport carrier and directs the cargo delivery across the CC.
Conclusions In Conclusion, multi-pathways were involved in the photoreceptor cell death and the deficiency of RPGR led to abnormal localization of the crucial proteins that participate in photoreceptor maintenance and phototransduction.

• 3584

Gene transfer of prolyl hydroxylase domain 2 inhibits hypoxia-inducible angiogenesis in a model of choroidal neovascularization

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Purpose:
Cellular responses to hypoxia are mediated by the hypoxia-inducible factors (HIF). In normoxia, HIF-α proteins are tightly regulated by a family of dioxygenases, both by proteasomal-mediated degradation and transcriptional inactivation. In hypoxic conditions, the dioxygenases become inactive and allow formation of HIF transcription factor, responsible for the upregulation of a myriad of target genes. In ocular neoangiogenic diseases, such as neovascular age-related macular degeneration (nAMD), the role of ischemia and hypoxia is associated with progression of choroidal neovascularization. Here, we investigate the effects of HIF-regulating proteins on the hypoxia pathway in retinal pigment epithelium (RPE) cells, critically involved in nAMD pathogenesis.
Methods ARPE-19 cells were transfected with HIF-regulating proteins. In vitro angiogenesis was assayed in human retinal and choroidal endothelial cells. In vivo analysis of the effects of HIF-regulating proteins was determined in mouse models of iris and choroidal induced angiogenesis.
Results Our previous results have associated HIF expression in RPE cells to CNV progression. Our data indicates that, in ARPE-19 cells, prolyl hydroxylase domain (PHD)2 is the most potent negative-regulator of the HIF pathway. Furthermore, the negative effects of PHD2 on the hypoxia pathway were associated with decreased HIF-1a protein levels, and concomitant decrease in secreted VEGF by these cells. Consequently, ARPE-19 cells stably expressing PHD2 impaired angiogenesis in endothelial cells, both in vitro and in vivo. Gene transfer of PHD2 in vivo resulted in mitigation of HIF-mediated angiogenesis in a mouse model of nAMD.
Conclusions These results may have implications for the clinical treatment, particularly regarding the use of gene therapy to negatively regulate neoangiogenesis present in nAMD patients.

• 3585

Autophagy is affected by Mitf in mouse primary RPE cells

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Purpose Microphthalmia-associated transcription factor (MITF) regulates the differentiation and development of the retinal pigment epithelium (RPE). Mice that lack functional MITF do not develop the RPE and have microphthalmia. Recent studies have involved MITF in autophagy regulation in other cell types. The purpose of this study was to examine if the Mitf gene plays a fundamental role in regulating autophagy in primary RPE cells using various mutations in the Mitf gene.
Methods Primary RPE cells from wild type and MITF mutant mice Mitf mi-enu122(398), Mitf Mi-Wh/+ and Mitf Mi-Wh/Mitf mi-mi) were isolated by enzymatic dissociation. The levels of LC3 and MITF were measured and compared by western blot in the primary RPE cultures from wild type and mutant mice. Basal autophagy was also analysed with western blots and confocal imaging using same markers in primary RPE cells from C5BL/6J mice. Untreated cells were compared to cells treated with the mTOR inhibitor Torin1, cells incubated in starvation media and cells treated with the autophagy inhibitor, bafilomycin A1 (Baf A1).
Results The treatment with starvation media and Torin1 increased the levels of LC3 in RPE cells. Furthermore, both starvation and Torin1treatment resulted in reduced MITF protein levels. Cotreatment of Torin1 or starvation with Baf A1 restored the protein levels of MITF and LC3. Only the LC3II protein was detected in RPE cells from MITF mutant whereas wild type RPE cells showed both LC3I and II, suggesting that the degradation pathway of LC3 is stalled in the RPE from Mitf mutant mice.
Conclusions This study suggests that autophagy is affected in Mitf mutant mice. This is consistent with in vitro data showing that MITF regulates expression of genes involved in autophagy.

• 3586

Splice-site mutation in the Bmpr1b gene of the mouse causes optic nerve head dysgenesis and retinal gliosis

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Purpose A novel splice-site mutation of the ***Bmpr1b*** gene was characterized in offspring of N-ethyl-N-nitrosourea (ENU) -treated mice; besides irregular limb morphology the mutants show an enlarged optic nerve head.
Methods Eye development of ***Bmpr1b*** mutants was analyzed for Bmp signalling via SMAD1 and 5, and for the expression of PAX2 as a transcription factor important for proper optic nerve head development.
Results BMP signalling indicated by the presence of phosphorylated SMAD1 and 5 was first observed in a few regions of the developing lens capsule and of the developing retina of mouse embryos at day 11.5 after fertilization. At this stage, no differences in SMAD1/5 phosphorylation have been observed between wild-type mice and the mutants. However, at the end of embryonic development (E17.5) and in the first days after birth (P7), higher concentrations of phosphorylated SMAD1/5 proteins are found at the optic nerve head region, whereas in the ***Bmpr1b*** mutants, the BMP signalling is dramatically reduced indicated by a significant loss of pSMAD1/5 staining. The clear reduction of the pSMAD1/5 in heterozygous and homozygous ***Bmpr1b*** mutants leads to a stronger optic disc cupping and to the formation of retinal gliosis indicated by the presence of disorganized and activated astrocytes. Loss of BMP-mediated signalling in the ***Bmpr1b*** mouse mutants is also accompanied by a decrease of ***Pax2*** expression at the optic nerve head region towards the end of embryonic development resulting in an additional line of arguments for the rather specific effect at the optic nerve head.
Conclusions The T-G mutation in the splice donor site of exon 10 of the ***Bmpr1b*** gene leads to retinal gliosis and hypoplasia of the optic nerve head, which is mainly caused by the repression of BMP-mediated signalling.

• 3621

Is glutamate dehydrogenase in astrocytes one of the keys to control brain glutamate homeostasis?

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Brain glutamate concentration needs to be balanced to avoid excitoxicity. Following glutamatergic neurotransmission astrocytes are responsible for clearance of the synaptic cleft via glutamate transporters. In the astrocyte the conversion of glutamate to glutamine is an essential part of the glutamate-glutamine cycle. But, a substantial amount of glutamate is oxidatively metabolized in the mitochondria, which to a large extent may be dependent on glutamate dehydrogenase (GDH). Thus, astrocytes are likely the main regulator of the brain glutamate concentration, but how do they do it? We have investigated the role of GDH in astrocytes with focus on energy and glutamate neurotransmitter homeostasis. We have used cultured astrocytes originating from CNS-specific GDH1 knock-out mice and cultures of astrocytes treated with siRNA against GDH. We find that an impaired GDH activity force glutamate to be only partially oxidized via the truncated TCA cycle and formation of another excitatory amino acid, aspartate. Astrocytes totally lacking GDH exhibit an increased glycolysis and impaired glucose oxidation, supporting that astrocytes are in a need for glutamate oxidation to sustain energy metabolism.

• 3622

Is neurodegenerative retinal diseases the result of disturbed energy metabolism in Müller cells?

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Extensive evidence reveals decreased energy turnover in neurodegenerative brain diseases. A similar critical role of hypometabolism as a contributor to the pathogenesis of blinding neuro-retinal diseases has been suggested. Although, neurons are the major consumers of glucose due to the high cost of signaling, the surrounding glial cells have multiple functions that are essential for neuronal metabolism. As such, the most abundant retinal glial cells, Müller cells, have been shown to possess unique features essential for maintenance of neuronal energetics and metabolism. The presentation will provide a brief overview on the current knowledge of metabolic cooperation between retinal neurons and Müller cells. Furthermore, perspectives of future strategies to improve retinal energy metabolism, and thereby prevent retinal neurodegeneration, will be discussed.

• 3623

Current neuroprotective strategies in glaucoma – implications of neuro-glial interactions

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Abstract not provided

• 3624

Optic nerve energy metabolism: the role of astrocyte glycogen

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Glycogen is a glucose storage molecule. We studied the physiology and functions of glycogen in CNS white matter using acutely isolated mouse optic nerve (MON), a typical CNS white matter tract. Glycogen is present in MON astrocytes. Aglycemia caused loss of the stimulus evoked compound action potential (CAP) after ~15 minutes. CAP decline coincided with exhaustion of usable tissue glycogen. Increasing glycogen content prolonged the latency to decline onset and, conversely, decreasing glycogen shortened this latency. Metabolic support provided by glycogen during aglycemia was abolished by an inhibitor of glycogen breakdown (DAB). The MON has a high resting level of extracellular lactate (~0.6mM). The metabolic support provided by glycogen during aglycemia is abolished by an inhibitor of glycogen breakdown (DAB) in MON. Both tissues exhibit high levels of extracellular lactate ([Lactate-]o), up to 50% of which derives from glycogen.
During aglycemia, glycogen in astrocytes is metabolized to lactate and 'shuttled' to axons (and possibly oligodendrocytes) to support oxidative energy metabolism. Glycogen breakdown and lactate transport to axons is also needed to sustain brief periods of intense axonal discharge.

• 3631

New insights into corneal lymphangiogenesis

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Lymphatic research has progressed rapidly in recent years. The cornea provides an ideal tissue for lymphatic study due to its accessible location, transparent nature, and lymphatic-free but-inducible features. Once induced by an inflammatory, infectious, chemical or immunogenic insult, corneal lymphatics enhance high volume delivery of antigens and immune cells, and accelerate transplant rejection. Our research goal is to elucidate the molecular and cellular mechanisms of corneal lymphangiogenesis and to identify new targets for therapeutic intervention. This presentation will introduce our recent advances in corneal lymphatic research and the implications in both ocular and non-ocular diseases.

• 3632

MiRNA-126 regulation in corneal neovascularization

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A microRNA (abbreviated miRNA) is a small non-coding RNA molecule (containing about 22 nucleotides) that functions in RNA silencing and post-transcriptional regulation of gene expression. miRNAs derive from regions of RNA transcripts that fold back on themselves to form short hairpins and resemble the small interfering RNAs (siRNAs) of the RNA interference (RNAi) pathway. The human genome may encode over 1000 miRNAs, which appear to target about 60% of the genes of humans and other mammals. A miRNA is complementary to the 3' UTR of one or more messenger RNAs (mRNAs) and has post translational regulation of the mRNAs. MiRNAs are known to be involved in the normal functioning of eukaryotic cells as well as many diseases. However, little is known about the role of microRNA in ocular diseases. We tested the microRNA expression in both corneal neovacualrization patients and animal models.

• 3633

Identifying VEGF-independent factors for targeted antiangiogenic therapy in the cornea

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Purpose: To identify prospective inhibitors of inflammatory angiogenesis that operate largely independent of the VEGF pathway.
Methods: Inflammatory angiogenesis was induced in the murine cornea using surgical sutures. Thereafter separate experiments were conducted to i) prevent neovascularization in an early phase by steroid (dexamethasone) or anti-VEGFA therapy, and ii) regress existing neovessels by removal of the initial stimulus. Phenotypic changes were examined by in vivo corneal imaging, whole-transcriptome expression analysis was performed by comparative bioinformatics analysis of gene microarray data, and expression of target genes of interest was confirmed by RT-PCR.
Results: Steroid treatment halted initial angiogenic sprouting while anti-VEGF therapy was less effective. Steroids targeted key inflammatory and angiogenic pathways largely unaffected by anti-VEGF treatment. Interestingly, several key inflammatory and angiogenic pathways unrelated to VEGF were suppressed during natural angiogenic regression while endogenous inhibitors of angiogenesis were activated.
Conclusion: The identified factors may represent novel therapeutic targets for possible mono- or combination therapy with anti-VEGF agents to improve efficacy.

• 3634

Molecular mechanisms of immune privilege of the cornea - as a potential of Immune checkpoint therapy

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The eye, which is endowed with immune privilege, is a rare organ that permits analysis of the regulatory mechanisms for inflammation in organs. In particular, studies using animal models of corneal transplantation have revealed the molecular mechanisms of corneal cell-mediated immune privilege. Several molecules expressed in the cornea induce apoptosis of T cells and delete effector T cells in the cornea. Constitutive expression of Fas ligand and programed death ligand 1 (PD-L1, B7-H1) on corneal endothelial cells induce apoptosis of effector T cells via Fas and PD-1, respectively. B7-H3 is also constitutively expressed in the corneal endothelium and iris cilialy body and plays a role in the induction of anterior chamber associated immune deviation (ACAID). We have also found that constitutive expression of glucocorticoid-induced TNF receptor family-related protein ligand (GITRL) in the cornea mediates local expansion of CD25+CD4+T regulatory cells and suppresses conventional effector T cell function via GITR. These differently functioning molecules contribute to the local immune suppressive microenvironment in the cornea. The study for the roles of B7RP-1 and Galectine-9 expressed in the cornea are also introduced.

• 3635

Corneal neovascularization: clinical aspects and the role of the immune system

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Recent scientific evidences emphasized the role of corneal emo-lymphangiogenesis and the active role of the immune system in corneal neovascularization (CN).Corneal neovascularization has an incidence rate of approx.. 1.4 million patients per year. CN is a natural defense of the cornea in the attempt to respond to invading agents, However, this process may cause permant damage to the corneal transparency and may be responsible of loss of visual function . A delicate balance regulates this "corneal angiogenic privilege" between FGF and VEGF and several antiangiogenic factors (namely the role of intact epithelium, the limbus, and other antiangiogenic molecules) This paper will review the role of corneal inflammatory vascularization as well as the role of antiangiogenic factors and the involvement of the immune system in this process. New and emerging treatment to counteract the corneal neovessels will be highlighted.

• 3641
Late intraocular relapses in retinoblastoma

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Purpose to report very late intraocular relapses in 6 patients treated for bilateral retinoblastoma.
Methods we rewied the charts of 6 children who presented late intraocular recurrences of retinoblastoma.Three were familial and three sporadic cases.The patients achieved first remission after treatment with neoadjuvant chemotherapy, external radiotherapy and focal therapy.Relapses ocurred after 6 to 17 years after first remission .
Results three out of six patients are currently in second complete remission after receiving futher treatments. Two cases were enucleated and one is still under treatment.Therapeutic approach is reported and discussed for each case.
Conclusions Retinoblastoma usually recurs within the first few years after treatment completion. Late and very late intraocular relapses are very rare but do ocur. A long-term and close follow-up is needed for early detection of late recurrences.

• 3642
Management of unilateral retinoblastoma with buphthalmia

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Purpose Locally advanced unilateral retinoblastoma (RB) not amenable to conservative treatments is treated with enucleation. Surgery is challenging in presence of buphthalmia, exophthalmia or severe periocular inflammation, carrying a risk for globe rupture with tumour dissemination. The aim of this study was to report the long-term results of neoadjuvant chemotherapy (CT) in this setting.
Methods Retrospective case series of unilateral group E RB patients without extraocular disease receiving pre-enucleation CT (etoposide-carboplatin) in a single centre between 1999-2011. Clinical, radiological and histopathological data were collected. Outcome measures were: surgical complications, pathological risk factors (PRF) for metastatic dissemination, systemic side effects, metastatic dissemination, survival.
Results 21 patients, median age 9 months (range 1,5-48) were included: 16 with clinical buphthalmia, 2 with orbital inflammation and 3 with uncontrollable ocular hypertension. MRI confirmed the clinical findings and ruled out extraocular disease in all cases. Enucleation was performed after 1 course of neoadjuvant CT in 16/21 (77%), the remaining 5 patients needing two. No surgical complications occurred. Pathological examination showed complete resection in all cases. PRF for were present in 7/21 (33%) eyes. Irrespectively, all children completed a 4-cycle CT regimen, as CT could mask PRF. Two children required hospitalisation for complicated aplasia, no other systemic side effects were reported. With a median follow-up time of 8 years (range 4-12), no metastatic dissemination occurred. Survival is 100%.
Conclusions Locally advanced unilateral RB with buphthalmia can be successfully treated with neoadjuvant CT prior to enucleation to make the surgery safer.

• 3643
Intraarterial and intravitreal chemotherapy in the combined treatment in children with group C and D intraocular retinoblastoma

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Purpose To evaluate the outcomes of Rb with group «C» and «D» after the combined treatment.
Methods 45 patients, 22 (49%) male and 23(51%) female were included in study, age ranging from 1 to 42 months (median -13,5±10,4 months).Children with age under one year - 62%. All 45 children received systemic chemotherapy VEC from 3 to 6 courses (median – 5courses). 4 children were undergone primary enucleation (group E). For the treatment of the eyes groups C and D Rb (n=49) local chemotherapy was added SIAC and/or IVCT on the average after the third course of VEC. Focal therapy was used if need to consolidate treatment (TTT and/or brachytherapy). IVCT was used in 32 patients for 34 eyes with vitreous disease with median number of courses 2 (1-6). SIAC was used in 41 patients for 45 eyes with retinal or subretinal disease with or without vitreous seeding with median number of courses 2 (1-3).
Results In 27 of 49 eyes after systemic chemotherapy the significant resorbtion of the tumor foci were revealed using chemotherapy, the other 22 eyes underwent additional treatment – in group C (TTT-4 eyes, brachytherapy – 5 eyes) and in group D (TTT – 6 eyes, brachytherapy -6eyes). The patients with Rb of groups «C» and «D» had disease free survival (DFS) of 56,1±8,9% with a median period of follow-up 26,9±2,5months. 44 of 45 patients with Rb of groups «C» and «D» are alive with no metastatic disease (median follow up of 20 months (range 3-43 months)). One of 45 patients died due to second malignant tumor - acute leukemia.14 of 15 eyes (93,3%) with group «C» and 31 of 34 eyes (91,2%) with group «D» were preserved by combined chemotherapy and focal therapy.
Conclusions Combined chemotherapy (VEC +SIAC+IVCT) with focal therapy allowed saving the eyes that enucleated earlier.

• 3644
New challenges in retinoblastoma treatment

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Purpose Retinoblastoma treatment has changed during the past ten years with the introduction of intraarterial and intravitreal chemotherapy. There is a trend to more conservative management and the challenge is to decide when to enucleate.
Methods We have made a retrospective study of patients treated in 2013and 2014. Unilateral retinoblastoma were treated by intraarterial melphalan and local treatments in selected cases and enucleation for advanced group D and for all group E eyes For bilateral retinoblastoma, conservative management was proposed with intravenous chemotherapy and local treatments Follow up every month under general anesthesia during the first year with treatment of small recurrences by laser or cryotherapy was performed
Results There were 40 bilateral retinoblastoma and 4 of them were metachronous.19 patients received 6 courses of 3 drugs and 21 received two courses of VP16 and carboplatin followed by carboplatin.All the children had local ophthalmological treatments started at the third cycle.21 children kept both eyes and 19 kept one eye. There were 72 unilateral retinoblastoma .43 (60%) were treated with primary enucleation and 29 (40%) were treated by conservative management. 21 of these eyes were saved and 8 were secondary enucleated. No patient developed orbital recurrence, optic nerve involvement or metastasis.
Conclusions The increase of conservative management in retinoblastoma is safe with proper selection of eyes and close follows up

• 3645

Clinical and morphometric investigation of retinopathy in children with retinoblastoma treated with chemotherapy

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Purpose To analyze the results of clinical and morphometric investigation of retina in children with retinoblastoma treated with systemic and local chemotherapy in comparison with children with primary untreated tumor.
Methods 55 children (87 eyes) with retinoblastoma treated with systemic chemotherapy, intra-arterial, intravitreal chemotherapy and 19 patients (38 eyes) with primary tumors before treatment were examined. All patients were examined by ophthalmoscopy using Ret Cam and spectral optical coherence tomography.
Results After systemic chemotherapy fundus examination revealed retinal edema, retinal artery narrowing, focal and / or diffuse choroidal blanching, pigmented foci of small and medium sizes. On tomograms - hyperreflective loop luminal narrowing, a significant decrease in the caliber of retinal blood vessels as compared to the norm of 16 ± 4,1 microns; waviness photoreceptor layer and its destruction; . In macula - 42.6% on tomograms - maculopathy, manifested disorganization RPE, cystoid edema, smoothness papillomacular beam forming beak shaped fovea and retinal thickening. In patients treated with primary systemic and intra-arterial chemotherapy diagnosed increase in retinal vascular caliber up to 116 ± 8,1 microns. The clinical picture after systemic chemotherapy and intavitreal chemotherapy in 14 eyes characterized by atrophy with the formation of small whitish and pigmented lesions. On tomogramms- unevenness and destruction of the inner layers of the retina and epiretinal membranes little-pointedhyperreflective tricks in the inner layers of the retina.
Conclusions The results of clinical and morphometric studies of the inner shells eyes, arising under the influence of chemotherapeutic agents are of interest in terms of predicting the visual functions of the child after the complete destruction of the tumor.

• 3646

Congenital Malignant Ciliary Body Medullepithelioma in Two newborns

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Purpose Intraocular medulloepithelioma is an extremely rare unilateral intraocular tumor arising from the nonpigmented ciliary epithelium. Medulloepitheliomas may be classified as benign and malignant and as teratoid and nonteratoid tumors.
Ciliary body medulloepithelioma is usually manifesting in early childhood, rarely at birth.
Differential diagnosis includes in particular unilateral retinoblastoma. Intraocular medulloepithelioma may also occur as masquerade-syndrome simulating uveitis.
Methods We report two new cases of intraocular malignant ciliary body medulloepithelioma in newborns presenting as leucokoria and buphthalmos at birth.
Results Both infants were enucleated and diagnosis was confirmed by histopathology.
Conclusions Medulloepithelioma is a rare childhood tumor and should be considered in the differential diagnosis of an intraocular mass in a child.
Imaging plays a limited role in differentiating the mass from other solid and cystic ciliary body masses but it is valuable in determining tumor extension and recurrences.
Advanced medulloepithelioma at birth with buphthalmos can simulate retinoblastoma and easily be misdiagnosed.

• 3647

Unravelling the potential of secreted frizzled related protein 3 as a vascular marker

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Purpose Secreted Frizzled Related Protein(SFRP)-3, is a member of the SFRP family of secreted glycoproteins involved in regulating the ubiquitous Wnt signalling pathways. We noted SFRP3 expression incidentally on blood vessels at the limbus, and there are limited reprots on vessles in tumours. We further explored this observation in a range of human eye tissues, comparing SFRP3 patterns with other established vascular markers, including ***Ulex europaeus agglutinin (UEA)-1*** lectin.
Methods Human post-mortem eyes(<18 hrs delay) (consent and Human Research Ethics Committe approval; Lions NSW Eye Bank and UNSW HREC), were fixed in 2% paraformaldehyde/0.1M PBS. Paraffin sections (n=6)) & flat mounts(choroid and retina) (n=6) were immunolabelled for SFRP3 and other markers [collagen IV (basement membrane), smooth muscle actin (SMA) (pericytes & smooth muscle cells), MHCII (microglia & macrophages)] and ***UEA-1*** (vascular endothelium). All immnuolabelling was visualised using confocal microscopy (Zeiss LSM700).
Results We observed SFRP-3 immunolabelling of blood vessels in different human eye tissues including limbus, choroid (and naevi, Madigan et al., EVER 2015) and retina. Both sections and flatmounts displayed obvious SFRP3 immunlabelling of endothelial cell membranes; SFRP3 co-localised with ***UEA-1*** lectin and Collagen IV (basement membrane). We also noted SFRP3+ neuron-like cell bodies & processes in peripheral retina, adjacent to the ***ora serrata***.
Conclusions SFRP3 consistently immunolabelled blood vessels in all ocular tissues examined. It does not appear to label pericytes or perivascular immune cells, but co-localised with ***UEA-1*** lectin (blood vessel 'gold standard') and basement membrane collagen IV, indicating its potential as a novel blood vessel marker.

• 3661

Fundamental principals and applied biophysics

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Pascal tonometry is a pressure sensor, made by a piezoresistive mycrocristal mounted on a concave tonometer, thus allowing a minimal contact with the anterior surface of the cornea. This design is meant to minimize the impact of the corneal components in the measurement of the transmural pressure. Carrying a weight of approximately 1g, the tonometer itself has 7mm in diameter with the crystal occupying the central 1.2mm. Its 100Hz reading rate allows a continuous pressure measurement which can be influenced by a number of variables ranging from axial length, to corneal elasticity.

• 3662

OPA analysis - oscillatory and autonomic influence

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Dynamic contour tonometry allows for a measurement of the ocular pulse amplitude. This parameter can relate to a number of local and systemic variables that can influence the fluctuation of intraocular pressure (from ocular rigidity to axial length and intraocular pressure itself).
Generating this pulse in ocular pressure mostly involves the flow pattern of the terminal branches of the carotid artery (ultimately responsible for 80% of ocular blood volume fluctuation). The pressure pulse can thus be analyzed from the systemic variables influencing the systolic volume injection, thus allowing for the interpretation of the oscillatory and autonomic input through the use of a local, eye-related device.

• 3663

Physiology and clinical relevance of this parameter

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Ocular Pulse Amplitude (OPA) refers to a fluctuation in pressure with the cardiac cycle. It has been widely used as a surrogate endpoint for ocular circulation with a number of studies inferring which ocular tissue, structural characteristics and vascular beds are responsible for this fluctuation. Accordingly, a number of ocular and conditions have been consistently associated with extreme OPA values (either high or low). Ranging from glaucoma to carotid stenosis, these conditions will be reviewed, thus providing the audience with a glimpse of the state of the art in the clinical implications of this parameter.

• 3664

Use of OPA in ocular blood flow studies

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The ocular pulse amplitude (OPA) measured by dynamic contour tonometry is one of the vascular parameters often used in glaucoma research. Probably measuring the pressure wave caused by the shifting volume of blood inside the eye in accordance to the cardiac cycle, this measurement gives information about extra- as well as intraocular hemodynamics. The Leuven Eye Study (LES) is one of the largest studies investigating ocular blood flow in glaucoma combining several non-invasive investigations like color Doppler imaging, enhanced depth imaging optical coherence tomography, oximetry and OPA. Three groups (primary open angle glaucoma – POAG, normal tension glaucoma - NTG and healthy subjects) were selected from the database of the LES. The relationship between the OPA, choroidal thickness and retrobulbar blood flow was assessed and results were compared with recent findings in the literature.

• 3671

EDI-OCT is less suited for close monitoring of primary stromal choroiditis when compared to Indocyanine green angiography

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Purpose Investigate the performance, utility, and precision, of enhanced depth imaging optical coherence tomography thickness (EDI-OCT-T), versus indocyanine green angiography (ICGA), in tracking any fluctuation in the activity of primary stromal choroiditis (PSC) in response to therapy during long-term follow-up.
Methods Patients with a diagnosis of PSC; Vogt Koyanagi Harada (VKH) or birdshot retinochoroiditis (BRC), with untreated initial disease with long-term follow-up including both ICGA and EDI-OCT, were recruited at the Centre for Ophthalmic Specialized care, Lausanne, Switzerland. Angiography signs were quantified according to established dual FA and ICGA scoring systems for uveitis. Changes in ICGA score, and EDI-OCT-T, in response to therapy, were assessed.

Results Among 1829 uveitis patients seen from 1995 to 2015, 59 patients (3.2%) were diagnosed with PSC of which 4 patients (2 BRC and 2 VKH) fulfilled the restrictive inclusion criteria. Mean EDI-OCT-T decreased from 672±101µm at entry to 358.5±44.5µm in a mean of 26.5 months at stabilization. Mean ICGA scores decreased from 28±4.2 at entry, to 5±7 at stabilization. Only ICGA was sufficiently sensitive and reactive to detect disease recurrencies and efficacy or absence of effect of successive treatment changes, detected in 7 instances during follow-up, but not recorded by EDI-OCT.
Conclusions This pilot study showed that ICGA was the more sensitive methodology; able to promptly identify evolving subclinical and occult choroidal disease and flag occult recurrence and/or therapeutic responses that were otherwise missed by EDI-OCT. Although EDI-OCT-T showed a linear decrease, these changes were too sluggish to be relied upon for close follow-up and timely adjustment of therapy.

• 3672

Analysis of choroidal folds in Acute Vogt-Koyanagi-Harada disease using high- penetration optical coherence tomography

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Purpose To characterize patients with Vogt-Koyanagi-Harada (VKH) disease with choroidal folds (CFs) and determine how the foveal choroidal thickness changes after initial treatment using high-penetration optical coherence tomography (HP-OCT).
Methods In this retrospective observational study, we analyzed 42 eyes of 21 patients with new-onset VKH disease to determine the demographic and clinical differences between patients with and without CFs.
Results Twenty-four (57.1%) eyes of 13 patients with VKH disease had CFs. The mean age of patients with CFs was significantly (p=0.0009) higher than that of those without CFs (49.1 vs. 39.4 years, respectively). The frequency of disc swelling was significantly (p=0.0001) higher in eyes with CFs than in those without CFs (95.8% vs. 38.9%). The choroidal thickness at the first visit was significantly (p=0.0011) greater in eyes with CFs than in those without CFs (794 ± 144 µm vs. 649 ± 113 µm). The choroid 6 months after the initial treatment was significantly (p=0.0118) thinner in eyes with CFs than in those without CFs (270 ± 92 µm vs. 340 ± 80 µm). The frequency of sunset glow fundus at 6 months in eyes with CFs was significantly (p=0.0334) higher than in those without CFs (62.5% vs. 27.8%).
Conclusions The development of CFs in patients with VKH disease was significantly correlated with age, disc swelling, and choroidal thickness. The eyes with CFs frequently developed a sunset glow fundus. The findings suggested that patients with CFs might have severe and longstanding inflammation of choroidal tissues.

• 3673

Comparison of retinal and choroidal involvement in sarcoidosis chorioretinitis

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Purpose To assess the respective involvement of retina versus choroid in ocular sarcoidosis (OS) using dual fluorescein (FA) and indocyanine green angiography (ICGA).
Methods Retrospective study on patients with the diagnosis of OS seen in the Centre for Ophthalmic Specialized Care, Lausanne, Switzerland. The diagnosis of OS was based on a compatible uveitis associated with a positive biopsy, or positive broncho-alveolar lavage, or bilateral hilar lymphadenopathies or 2 of the 3 following laboratory test including elevated lysozyme, elevated angiotensin converting enzyme or elevated polyclonal activation, together with a negative quantiferon-TB Gold test. Angiography signs were quantified according to an established FA and ICGA scoring system for uveitis (Int Ophthalmol. 2010;30:539-52 and Ocul Immunol Inflamm 2010;18:385-9).
Results Among 1325 uveitis patients seen from 2000 to 2015, 23 patients (4 men) fullfilled the diagnostic criteria and could be included in the study. The choroid was predominantly involved in 19 patients (82.6%) and the retina in 4 patients (17.4%). The mean angiographic score was 7.3±4.6 for the retina versus 14.2±5.1 for the choroid (p<0.0001). In 3 of 23 patients (13%), FA did not show retinal inflammation while ICGA was strongly positive, showing occult choroidal lesions.
Conclusions This study shows for the first time the respective involvement of retina and choroid in OS. Choroid is preferentially involved for which ICGA is the examination of choice. By looking only at FA, there is a risk of underestimating global ocular involvement and to miss choroidal involvement. To evaluate correctly intraocular inflammation in OS and to have a better follow-up, the use of dual FA & ICG angiography is recommended.

• 3674

Contribution of dual fluorescein and indocyanine green angiography to the appraisal of posterior involvement in birdshot retinochoroiditis and Vogt-Koyanagi-Harada disease

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Purpose To assess the levels of retinal versus choroid involvement in two stromal choroiditis entities, birdshot retinochoroiditis (BRC) and Vogt-Koyanagi-Harada (VKH) disease in initial onset non treated disease.
Methods This retrospective study included patients diagnosed with BRC and VKH, seen during initial onset disease at the Centre for Ophthalmic Specialized Care, Lausanne, Switzerland. Angiographic signs were quantified, using an established dual FA and ICGA scoring system for uveitis, and the FA/ICGA ratios were compared between diseases.
Results Among 1739 patients with uveitis seen from 1995 to 2014, 7 newly diagnosed BRC patients and 4 patients with newly diagnosed VKH disease were included in the study. Patients with BRC and VKH had mean FA angiographic scores of 16.64 ± 3.75 and 4.25 ± 1.83; mean ICGA angiographic scores of 21.00 ± 3.48 and 25.25 ± 3.84; and mean FA/ICGA ratios of 0.79 ± 0.21 and 0.17 ± 0.09, respectively.
Conclusions This study showed the differential involvements of the retina and choroid in BRC and VKH. Choroid was predominantly involved in both diseases, which clearly indicated that ICGA was the method of choice, and that it should be performed in conjunction with FA. Also, the FA/ICGA ratio highlighted the fundamental differences between BRC and VKH. VKH had a purely choroidal origin of inflammation, and BRC had both retinal and choroidal origins of inflammation.

• 3681

Atopic and vernal keratoconjunctivitis: differences and similarities

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Vernal keratoconjunctivitis (VKC) and atopic keratoconjunctivitis (AKC) represents two severe forms of ocular allergies. In children both are rare diseases and may lead to visual impairment. VKC is a disease that affects primarily boys and children from 3 to 16 years old. Usually VKC disappears at adolescence. Photophobia and tearing are highly specific symptoms other than those usually observed in common ocular allergy as itching and grittiness. Two forms of the disease occur tarsal and limbal vernal keratoconjunctivitis. Tarsal form is marked by cobblestone papillae on the superior tarsal conjunctiva. Limbal form is marked by a broad thickened, circumferential gelatinous opacification of the limbus. Horner-Trantas dots are characteristic of this form. AKC in children can be misdiagnosed as the presentation appears similar however atopic dermatitis is accompanying the ocular allergy with skin dryness signs. The specific signs of each disease will be detailed. The diagnosis has to be performed as early as possible in order to specify the prognosis, regression in VKC, progression in AKC.

• 3682

Imaging of allergic keratoconjunctivitis

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Abstract not provided

• 3683

Non-ocular treatments in ocular allergy

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Abstract not provided

EVER 2016
Saturday, Oct 8

• 4111

Homo heidelbergensis: the oldest case of odontogenic orbital cellulitis?

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Homo heidelbergensis, an extinct species of the genus Homo, is probably the ancestor of Homo sapiens in Africa and the Neanderthals in Europe. In 1992, one the most complete and best preserved ancient hominid skulls ever found was discovered in a Middle Pleistocene cave called the Sima de los Huesos, Atapuerca site (Spain). Skull 5 dates back to 350,000 to 500,000 years ago and represents a nearly complete Homo heidelbergensis cranium. An extensive osteitis on the left maxilla, a worm-like pattern on the orbital roof and several dental lesions with remodelling and recession of the alveolar crest were described. Computed tomography (CT) images identified a maxillar fracture and determined the timing of the pathological events. These findings suggest that an ongoing serious infection might had been present in this individual at the time of death and that it was very likely the cause of death from a generalized sepsis. The infection would have spread from the dental abscess into the ipsilateral orbit. In a "pre-antibiotic era," the lack of sinus and orbital drainage might have led to intracranial infection or sepsis. We will discuss the anatomic pathways by which dental infection could spread to the orbit in what seems to be the first documented case of orbital cellulitis.

• 4112

The first cataract surgery

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The couching technique was the predominant procedure to surgically remove cataracts until the 18th century, when Jacques Daviel introduced the extracapsular technique of extraction. The exact time of couching introduction is unknown, although Sushruta has been pointed for many years as its pioneer and the one who firstly described it. However, the first clear mention of this procedure comes from non-ophthalmologist, the Greek stoic Chrysippus in the third century BC. There is no proof that cataract surgery was performed in ancient Egypt, although our present knowledge on ancient Egypt medicine is rather scarce. Sushruta also described the technique of extraocular evacuation of cortical masses with Valsalva maneuver, and later in the Middle Ages, some Arab physicians tried to aspirate the opaque lens by means of a glass tube following a paracentesis.

• 4113

The first steps in retinal angiography

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Abstract not provided

• 4114

The firsts in ophthalmic echography

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Clinical ophthalmic ultrasound began with the A-scan. The most recognized early pioneer in this field was a Finnish ophthalmologist Dr. Arvo Oksala (1920-1993), later Professor and Chair of the Turku University Eye Clinic. He began to explore ultrasound with the physicist Antti Lehtinen in 1957, a year after the first paper on this topic written by Mundt and Hughes. Oksala and Lehtinen used an industrial ultrasound from a large metal company. The same year they published their first results: detection of non-metallic foreign bodies, retinal detachments and tumors in the eye. Further work allowed differentiation between a subretinal haemorrhage and a choroidal tumor. Together these two investigators published 23 papers on ophthalmic ultrasound within the first 5 years. From 1968 to 1971, prof. Oksala was the President of the Societas Internationalis pro Diagnostica Ultrasonica in Ophthalmologia (SIDUO) that had been founded in 1964, and in 1971 he became its Honorary Member and in 1984 he received its Pioneer Award. The second recipient of the Pioneer Award in 1984 was Dr. Gilbert Baum (1922-2002) from the Albert Einstein College of Medicine, New York. He was the primary developer of the B-scan technique to examine the human eye.

• 4115

Charles-Michel Billard (1800-1832), the founder of neonatology and ophthalmology

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Abstract not provided

• 4121

Central keratoconus and bilateral asymmetry of keratoconus

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Today, different measurement techniques are used in clinical routine for detection and monitoring of keratoconus and progression of the disease. In this talk we describe topo- and tomographical paramenters for centered or decentered corneal ectasia in terms of central and classical keratoconus. We demonstrate how to evaluate progression of keratoconus and side asymmetry in bilateral keratoconus. With the use of modern tomographical instruments, ophthalmologists are able to differentiate entities such as central or classical keratoconus.

• 4122

Interpretation of keratoconus indices

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We provide an overview on the dedicated keratoconus indices of Pentacam (Scheimpflug-based tomographer), CASIA SS-1000 (anterior segment optical coherence tomographer), TMS-5 (Scheimpflug and Placido tomo-/topographer) and Ocular Response Analyzer (pneumotonometer which features measurement of biomechanical properties). We demonstrate how modern keratoconus screening software modules such as the Belin-Ambrósio Enhanced Ectasia Display (BAD) or the ectasia screening of the CASIA/TMS-5 work in comparison to the classical McDonnell/Rabinowitz and Smolek/Klyce/Maede indices, and we point out the differences between metric keratoconus indices and classificators. We will also discuss the diagnostic capacity of the devices and indices/classificators in detail.

• 4123

Keratoconus, keratoglobus, keratotorus and pellucid marginal degeneration

SZENTMARY N
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Topo- and tomographical characteristics of different entities such as keratoconus, keratoglobus, keratotorus and pellucid marginal degeneration are shown and discussed. The audience will be guided how to discriminate between those pathologies, and the spectrum of treatment options will be discussed controversely.

• 4124

Relevance of the posterior corneal surface for detection of early keratoconus and post-LASIK keratectasia

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We present different display techniques for the anterior and posterior corneal surface such as axial or tangential power map, pachymetry map, height or enhanced height map or results of mathematical decomposition techniques such as Fourier or Zernike maps. We discuss the advantage and drawbacks of those maps for detection and evaluation of keratoconus severity. The variety of the output maps of different instruments such as the Orbscan IIz or TMS-5, the Pentacam and the Casia-1000 are shown and discussed in detail. Additional information of new parameters such as ratio of anterior to posterior surface curvature are introduced and the diagnostic value for evaluation of early forms of keratoconus will be tailored-out.

• 4125

Corneal tomographical changes following crosslinking

ZSOLT NAGY Z

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We show the potential of Scheimpflug-based tomographic indices for indication and postoperative monitoring of corneal collagen cross-linking (CXL) performed in progressive keratoconus. The value of tomographic indices for validation of corneal flattening after CXL in the long term is being discussed. In addition, we will focus on keratoconus index (KI) and index of height asymmetry (IHA) provided by the Pentacam, which have been established in clinical routine for monitoring of the long-term stabilization effect of CXL on the corneal architecture.

• 4131

New breakthrough in severe corneal infections: GMA, cross linking

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Abstract not provided

• 4132

Specificities of corneal infectious diseases in children

BREMOND-GIGNAC D
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Infectious keratitis in children is not common but can cause a severe visual impairment if late diagnosed with delayed treatment established or with weak efficacy. Corneal infections in children can affect subjects of all ages with a high frequency in newborns and infants. In infant, children and teenagers the most common ocular pathogens, that differ from the adult, are ***Haemophilus Influenzae***, ***Staphylococcus aureus,*** ***Streptococcus pneumonia*** and also ***Moraxella*** species. These infections infections could lead to ulcers and sight-threatening complications. In children corneal infections can be difficult to diagnose because the pathology can develop without pain. In addition, the examination may be difficult to perform. Identification of the pathogen must be performed as far as possible. The treatment should be provided earlier and aims to eliminate the bacteria, virus or fungus pathogens. Specific epidemiology of pathogens will be detailed according to age. Risks of visual impairment and amblyopia must be integrated. An update on topical antibiotics and current options will be reviewed with practical aspects, diverse clinical cases and considering quality of life of children and parents.

• 4133

Prevention of Herpes and Zoster keratitis

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Herpes Simplex Virus (HSV) and Varicella-zoster Virus (VZV) are two leading causes of sight-threatening keratitis. They are able to become latent in nervous system, especially the trigeminal ganglia in which they can reactivate, thus producing new viral particles that finally reach the cornea.
Episodes of HSV keratitis may occur spontaneously or following a triggering factor like immunosuppression (including topical steroids), topical inflammation and nerve injuries. Ocular surgery, which combines several of these factors, is a strong risk factor of HSV keratitis reccurence. In case of exposure to one of these triggering factors, prevention with oral antiviral drugs reduces the risk of relapse of HSV keratitis.
For VZV, the main risk factor of keratitis is the occurrence of chickenpox or herpes zoster ophthalmicus (HZO) some days to weeks before. The prescription of oral antiviral drugs at the time of cutaneous rash is efficient for reducing the risk of ocular complications of HZO. However, the arrival of the anti-HZO vaccine could change the deal in the next years.

Conflict of interest
Any consultancy arrangements or agreements:
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Any Lecture fee paid or payable to you or your department:
ALCON, ALLERGAN, MSD, SANTEN, THEA

• 4141

BAP1 germline mutations in uveal melanoma patients without family history of eye cancer

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Purpose Germline pathogenic variants of the BRCA-1 associated protein-1 (*BAP1*) gene predispose to uveal melanoma and several other cancers. Testing for germline *BAP1* mutations should be performed if typical BAP1 cancer predisposition syndrome tumors have been diagnosed in the family. We report the frequency of germline pathogenic variants of *BAP1* in consecutive Finnish uveal melanoma patients without known history of eye cancer.
Methods In Finland, uveal melanomas are treated centrally in the Ocular Oncology Service, Helsinki University Hospital. We collected clinical data and genomic DNA from 239 of 389 consecutive patients diagnosed from January 2010 to December 2015. Patients with verified family history of eye cancer were excluded. Fifteen patients had died before the study started and could not be sampled. The exons and exon-intron junctions of *BAP1* were sequenced.
Results We found only one probable pathogenic germline variant, a donor splice site mutation in a highly conserved region immediately after exon 2 in a 57-year-old male patient. Three of his family members had been diagnosed with typical BAP1-related cancers (cutaneous melanoma, mesothelioma, and renal cell carcinoma). The mutation was not found in 61,486 controls from the ExAC (http://exac.broadinstitute.org). The frequency of germline BAP1 mutation in patients without any family history of eye cancer was 0.4% (1/239, 95% CI 0.01 to 2.2).
Conclusions The frequency of BAP1 germline pathogenic variants in the Finnish patients with uveal melanoma without family history of ocular cancer is low. The family history of typical BAP1-related cancers was informative, and should routinely be obtained to guide the *BAP1* genetic testing.

• 4142

Chromosomal aberration predict uveal melanoma mutation status

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Purpose Rationale: In uveal melanoma (UM) non-random chromosomal aberrations occur and correspond to patients' prognosis. Mutations in UM specific genes, such as BAP1, SF3B1 and EIF1AX are also used to predict survival. Aim of this study is to identify these mutations corresponding to a specific chromosomal signature in UM.
Methods Methods: For 277 UM patients SNP array data (n = 214) and/or conventional karyotyping (n = 119) of the tumor was available. The mutational status was known in 189 patients. Based on the mutational status, SNP array and conventional karyotyping data was analyzed for recurring copy number variations (CNVs) and structural variants (SVs). Hierarchal clustering of the SNP array data was performed to construct clusters. These clusters were correlated to the mutational status.
Results Results: BAP1, SF3B1 and EIF1AX-mutated UMs display specific chromosomal patters with recurring CNVs. Both BAP1-mutated and SF3B1-mutated UMs are characterized by specific chromosome anomalies and SF3B1 mutated tumors were characterized by multiple (>3) SVs of the genome. EIF1AX-mutated UM were characterized by only chromosome 6p gain without additional CNVs. Hierarchal clustering of the SNP array data revealed five clusters of which two clusters predicted BAP1 mutations, one cluster SF3B1 mutations, one cluster EIF1AX mutations or wildtype UM and one cluster predicted SF3B1 mutations, EIF1AX mutations or wildtype.
Conclusions Conclusion: UMs with either BAP1, SF3B1 or EIF1AX mutations display a mutation-specific chromosomal pattern. Based on the chromosomal patterns the genetic mutation in UM can be predicted.

• 4143

Inflammatory Cell Infiltrates in Metastatic Uveal Melanoma

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Purpose Current treatments for metastatic UM (MUM) are very limited and rarely prolong patient survival. Immunotherapy trials for MUM are few, and to date have only demonstrated marginal success. High densities of tumour associated macrophages (TAMs) and infiltrating T lymphocytes (TILs) in primary UM are associated with a poor prognosis. There is little known about the immunomodulatory/microenvironment of MUM. Our aim was to examine the presence and distribution of TAMs and TILs in MUM within the liver.
Methods Whole tissue sections of liver MUM (n=16) were examined by immunohistochemistry. For TAMs, the monoclonal antibodies (mAb) against CD68 and CD163 were used. Macrophage number and morphology were graded following the method described by Mäkitie et al (IOVS 2001;42(7):1414-21). Number and spatial distribution of TILs were highlighted using Abs against CD3 (pan-lymphocyte marker), CD4 (T-helper cells) and CD8 (T-cytotoxic/suppressor cells).
Results CD68+ and CD163+ TAMs were noted within the tumour in all 16 specimens; their numbers were 'few to moderate' in ≥85% of cases and the majority showed an intermediate phenotype. CD3+ TILs were noted both within MUMs and surrounding the tumour, at the interface with normal liver. Of these CD8+ TILs were 'few' in number within MUM but were predominantly seen at the tumour/normal liver interface, whilst CD4+ TILs showed a high perivascular density within MUM. The CD4 mAb also highlighted resident Kupffer-Stern macrophages.
Conclusions CD68+ and CD163+ TAMs of intermediate morphology were observed in MUM, suggesting a tendency towards the pro-tumourigenic M2 phenotype. CD4+ TILs were seen mainly infiltrating MUM, whereas CD8+ TILs tended to be peritumoural. The biological role of inflammatory cells in MUM requires further investigation, to determine if they represent potential targets for future therapies in MUM.

• 4144

Histomorphological changes of uveal melanoma (UM) following proton beam therapy (PBR)

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Purpose PBR is used for the treatment of UM. Little is known about histomorphological alterations in UM following PBR. Our aim was to document these changes.
Methods Data was obtained for 25 UM enucleation samples following PBR between Jan 2005-Dec 2015. Histological sections were examined for morphological changes affecting tumour cells, its microenvironment and adjacent sclera. Data was analysed using SPSS Software.
Results 730 patients underwent enucleation at the Liverpool Ocular Oncology Centre (646 primary, 84 secondary); 41 underwent enucleation following PBR, of which 25 samples were analysed. Histological examination of tumour type classified 5 UM as epitheloid, 9 spindle, and 11 as mixed. Focal necrosis was seen in 10 cases (41.7%); bizarre mitoses in 5 (20.8%); tumour cell- ballooning in 17 (70.8%) and mummification in 12 (50%); and vessel wall- thickening in 13 (54.2%) and hyalinization in 15 (62.5%). Prominent tumour infiltrating lymphocytes (TIL's) were noted in 17 UM (70.9%), and tumour-associated-macrophages (TAM's) in 15 (62.5%); 19 UM (79.2%) had noticeable degenerative scleral changes. Median time elapsed between PBR and enucleation was 14.5 months (range 7-26). Bivariate analyses demonstrated statistically significant correlations between interval from PBR to enucleation and histological changes (bizarre mitoses (p=0.035); tumour cell mummification (p=0.025), nuclear inclusions (p=0.002); TILs/TAMs (p=0.022); plasma cells (p=0.021); and hyalinisation (p=0.031). UMs enucleated >20 months following PBR were 1.73 times more likely to have inflammation and bizarre mitoses than eyes enucleated within 10 months following PBR (p=0.041).
Conclusions The histopathological alterations of UM following PBR are complex, and evolve over time, with increasing degenerative and inflammatory changes. Immunohistochemical and genetic studies are underway.

• 4145

UM Cure 2020 - A Consortium of European experts in Uveal Melanoma to identify new therapies for patients with metastatic disease

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Purpose Uveal melanoma (UM) is a rare intraocular tumour with an incidence of 5 cases per million individuals per year. Up to 30% of UM patients develop metastases, most often in the liver, and there is no therapy to either prevent or treat these metastases. Despite new discoveries in the genetic and molecular background of the primary tumour, little is known about the metastatic disease.

In UM Cure 2020, funded by European Union's Horizon 2020 programme, we will identify and validate at the preclinical level novel therapeutic approaches for the treatment of UM metastases (www.umcure2020.org). The Consortium brings together major EU experts in clinical, translational and basic research on UM, as well as patient representatives and innovative biotech companies.

Methods An ambitious multidisciplinary approach is proposed to move from patient tissue characterisation to preclinical evaluation of single or combinations of drugs. We will characterise the genetic landscape of metastatic UM and its microenvironment, perform proteomic studies to address signalling pathway deregulation and establish novel relevant in vitro and in vivo UM models. Underpinning this will be our virtual sample registry, linking existing biobanks into a harmonised network, which will prospectively collect primary and metastatic UM samples.

Results In parallel, we are already evaluating in the first phase of the project the efficacy of a series of active compounds using partners' available models. In addition to the initiation of UM-dedicated clinical trials, dissemination of results includes initiatives to increase patient information and disease awareness, in particular by supporting the formation of a European UM patient network.

Conclusions The UM Cure 2020 Consortium holds great potential to make significant advances in the treatment of metastatic UM, at present an incurable disease.

• 4161

Neuroinflammation as fuel for axonal regeneration: unravelling the underlying molecular players

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Abstract not provided

• 4162

Metabolomic profile of surgical glaucoma patients

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Abstract not provided

• 4163

The interplay between dendrite and axon regeneration in central nervous system repair: which way to grow ?

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Abstract not provided

• 4164

Enhanced donor selection in the treatment of LSCD using advanced imaging techniques

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Abstract not provided

• 4165

Intravitreal injection of mRNA containing nanoparticles to introduce sustained expression of neurothrophic factors in Müller celles

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Abstract not provided

• 4166

Tissue engineering in Ophthalmology: Regenerating the anterior cornea using synthetic collagen-mimicking nanoscaffolds and Limbal Epithelial Stem Cells

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Abstract not provided

• 4167

Role of TonEBP inthe inflammatory response of ARPE-19cells subjected to hyperosmolar stress

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Abstract not provided

• 4168

3D printed recombinant human collagen scaffolds for corneal tissue engineering: an in vivo study of biocompatibility

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Abstract not provided

• 4421

Spectrum of indications, patient selection, options for astigmatic corrections, pre- and postoperative patient care

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First different options for correcting corneal astigmatism in a phakic or pseudophakic eye are discussed controversally. In a second step we present a general overview on indications and contraindications for toric implants and criteria for selecting appropriate patients are shown. In a third step we address obligatory and facultative examination modalities prior to surgery and for monitoring of the postoperative results. Special focus is given to the preoperative patient counseling about potential risks and signs of complications.

• 4422

Instrument assisted diagnostics – biometry, topography and wave-front analysis

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We start with an overview on biometric, tomographic, topographic and other complimentary examination techniques and instruments. Criteria and indicators are presented to tailor out whether measurements qualify for an appropriate calculation of pseudophakic and phakic toric lens implants. As a hot topic we show how to discriminate between regular and irregular portion of astigmatism in a tomographic or topographic measurement and how to use this information for calculation. We will address the issue, which data from the large set of information provided by the instrument software should be used for toric lens calculation. We will provide hints where to look at the printouts from the devices. Finally, we provide a compact workflow for device assisted examination for toric lens planning.

• 4423

How to calculate pseudophakic and phakic toric implants?

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Different calculation modalities for pseudophakic and phakic toric lens implants are discussed: what are the benefits and drawbacks of formula-based and raytracing techniques? How could we set-up our own calculation sheet in a standard PC software package? A step-by-step calculation is shown in a clinical example. When do we need customized software? How can we evaluate residual refractive error after axis displacement of the toric lens implant? A list of commercial and non-commercial online calculators for toric lenses is shown.

• 4424

Intraoperative optical coherence tomography (iOCT) assisted positioning of toric lens implants

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The effectiveness of the correction of astigmatism majorly depends on the accuracy of the positioning of the toric lens implant in the eye. Appropriate removal of viscoelastic, proper centration and axis alignment have a direct impact on the effectiveness of the astigmatic correction. For phakic toric lenses positioned in the anterior or posterior chamber of the eye or adapted to the iris, as well as for pseudophakic toric lenses postioned in the capsular bag, the intraoperative use of real time OCT scanner (e.g. RESCAN 700 Zeiss) allows for an evaluation of the lens positioning. iOCT plays also a role in the estimation of the axial position of the lens, e.g. for customization of the IOL constants for formula-based IOL calculation or the circular contact force to the posterior capsule for prevention of secondary cataract formation. In this talk we would like to show the potential of iOCT use and tailor out the add-on value of this exciting technology.

• 4425

Surgical aspects of toric lens implantation and complication management

BARRAQUER R I

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In this contribution we would like to give an overview in the spectrum of pseudophakic and phakic toric lenses currently on the market. The audience will be guided how to select the proper lens for the indivual patient. Perioperative marking, surgical technique, intraoperative positioning and validation of lens alignment will be addressed in detail. Techniques are shown how to prevent postoperative rotation, decentration or tilt of the lens. In a last step, we will demonstrate how and when to re-position or re-align (in axis) the pseudophakic or phakic toric lens implant in case of decentration, tilt or axis rotation. The add-on value of modern intraoperative assistance / guidance functions for proper positioning of the toric lens implant or re-positioning in terms of complication management is shown.

• 4431

Know your bubbles

DUA H S

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Deep anterior lamellar keratoplasty (DALK) is the gold standard for corneal transplantation in pathology that does not affect the Descemet's membrane (DM) and endothelium. Knowledge of the surgical micro anatomy of the posterior stroma is important in understanding the procedure and increasing the success rate.

Anwar's 'Big Bubble' technique is the most popular. Three types of big bubbles (BB) can form. The most common one is the Type-1 where the BB forms between deep stroma and the pre-Descemets layer [Dua's layer- DL]. This is the most desirable one and successful DALK can be carried out even if there is a micro or macro perforation of this layer. The less common ones are the Type-2 BB where the BB forms between DL and DM; and the Mixed BB (combination of types 1 and 2). In Type-2 BB there is risk of rupture or bursting of the BB. By careful handling and ensuring that the eye pressure is constantly kept low by releasing aqueous through the paracentesis, DALK can be successfully completed when both Type-2 and mixed BB are formed. The surface of Type-1 BB is rough looking and Type-2 is very smooth. The former extends to no more than 8.5mm while the latter and Mixed BB can extent to the periphery of the cornea.

• 4432

What to do when no bubbles? and post operative pitfalls

GICQUEL JJ

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Abstract not provided

• 4433

Surgical tips through clips

SAID D

Queens Medical Centre, Derby Road,

Abstract not provided

• 4441

Long-term visual acuity preservation after proton therapy for peri- and parapapillary melanoma patients treated at the Paul Scherrer Institute

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Purpose To assess long-term visual acuity (VA) preservation in patients with peri- and parapillary melanoma after proton therapy (PT).
Methods We evaluated 24 high-risk for visual impairment patients with yet preserved long-term VA treated from March 1987 through December 2004 at the Paul Scherrer Institute.
Results Median follow-up was 11 years (range: 5.2-22.3). Mean patient's age was 51.3 years. Median tumor height was 2.8 mm (range: 1.8-5.2) and largest basal diameter, 11.4 mm (range: 6-17.9). In 9 patients (37.5%) the tumors abutted the optic disk, while 15 patients (62.5%) presented with tumors at a median distance of 1 mm (range: 0.1-2.4) and 2 mm (range: 0.1-5.7) from the optic disk and macula, respectively. Median baseline VA was 1.0 (range: 0.4 to 1.5). Between the second and eight year after PT, slight variations of median VA were observed, which however remained stable at 0.9(range: 0.5-1.25). Thereafter, VA decreased under 0.6 in 7 (29%) patients. Seven patients (29%) developed papillopathy (median at 3 years after PT), with one of them losing useful VA (0.01), 22 years following PT. Macular area receiving ≥ 30 CGE was an unfavorable prognostic factor for preserving long-term useful VA.
Conclusions Preservation of visual function in some of these cases could be consequential to reduced radiation exposure to the macula and optic nerve behind the disk. We speculate on a possible role of the posterior ciliary artery (PCA) and their capillary anastomoses, protecting the papillo-macular area from ischemia.

• 4442

Outcomes after proton beam therapy for large choroidal melanomas in 492 patients

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Purpose To evaluate proton beam therapy (PBT) as a mean to preserve the eye and spare some vision while not deteriorating survival in patients with large choroidal melanomas.
Methods This is a retrospective, consecutive cohort study of patients with T3-4 choroidal melanomas according to the 7th edition of the American Joint Cancer Classification treated with PBT over a 24-year period.
Results 492 patients were included. Mean tumor thickness and diameter were 8.77 (2-15) mm and 14,91(7-24.1) mm, respectively. Mean macular and optic disc distance were 4.56 (0-19.9) mm and 4.59 (0-22.1) mm, respectively. Mean follow-up was 61.9 months. Rates of neovascular glaucoma (NVG) and enucleation (mainly for local recurrence or NVG) were 27.0% and 19.5%, respectively. Enucleation rates decreased over time. The five-year local control was 94%. Mean baseline visual acuity was 20/63, and visual acuity ≥ 20/200 was preserved in 20% of patients. At five years, 25% of T3 patients presented with metastasis, overall and specific survival rates were 65% and 75%, respectively.
Conclusions local control after PBT remained good with increasingly manageable complications and fewer secondary enucleations over time for these large melanomas. As PBT does not seem to deteriorate survival in these patients having a high risk of metastasis, PBT may be considered as a safe and efficient alternative to enucleation in patients with large choroidal melanoma, and may help to spare some vision.

• 4443

Dry eye syndrome following proton therapy of ocular melanomas

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Purpose Some institutions contra-indicate proton therapy (PT) for ocular melanomas of temporal superior location (TS) owing to lacrimal gland irradiation and the risk of dry eye syndrome (DES) and advocate brachytherapy. We investigated whether PT can be safely performed in TS melanomas.
Methods location, DES grade and dose to the lacrimal gland estimated from Eyeplan blindly by two operators were correlated in consecutive patients treated from 1999 to 2014 with 52 Gy
Results of 1473 patients, 13.6% had DES, including 5.4% with severe DES (sDES). Temporal superior and temporal melanoma patients had a higher risk of DES than patients with melanomas in other quadrants (p<0.001). Severe DES was noted in 18.6% of TS melanoma patients (versus 5.4% in patients with melanomas in all other quadrants) and 12.3% of temporal melanoma patients (versus 3.0%) (p<0.001). sDES was more frequent in ciliary vs choroid melanomas, advanced vs early stage (p<0.001), and higher percentages of eye surface, lens periphery or ciliary body (p<0.001), cornea irradiated at any dose level (p=0.002). sDES was associated with more eyelid dermatitis or alopecia (p<0.001), and glaucoma/rubeosis (p=0.002). Vision changes were similar in patients with TS melanoma or other locations, including for patients experiencing severe DES (+1.15 vs +1.14 logMAR). No patient underwent enucleation for complications of DES.
Conclusions DES and sDES were more frequent in TS melanomas incriminating the lacrimal gland but temporal melanomas experienced more DES. In addition to correlation sDES and lens, cornea and lid irradiation, this suggests involvement of such structures as the limbus cells, conjunctival glands and long ciliary nerves. Rates of sDES compared favorably with the literature and DES was manageable. Tumor location should not contraindicate PT.

• 4444

Proton beam radiotherapy (PBR) for the treatment of retinal capillary haemangioblastoma

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Purpose We describe the treatment of retinal haemangioblastomas with proton beam radiotherapy as a primary treatment for juxtapapillary lesions, and as a secondary treatment in refractory cases.
Methods Retrospective analysis of patients from Jan 1997-Dec 2011 with retinal haemangioblastomas treated in the Clatterbridge Cancer Centre Douglas Cyclotron. Patients were treated with reduced dose 18Gy.
Results Seven patients were treated, 4 with Von Hippel Lindau syndrome. Five cases had juxtapapillary lesions; 5 had previous failed therapy; argon laser photocoagulation-3, photodynamic therapy-3, intravitreal anti-VEGF (bevacizumab/abflibercept)-4, ruthenium-106 plaque brachytherapy-2, vitrectomy with endolaser-1. Tumour diameter was 4.0-7.2mm (mean 4.8mm) and thickness 1.2-4.2mm (mean 2.2mm) with visual acuity logMAR 0.0-hand movements (mean 0.9). Mean follow up was 24months (12-48m). Within three months, all lesions regressed which continued over 18 months; tumour diameter decreased by 2.7mm (1.5mm depth). All cases demonstrated resolution of subretinal fluid within 3-6months; however 3 developed radiation maculopathy at 12-22months and were treated with intravitreal bevacizumab with good effect. Five patients had visual stabilisation; one case had visual improvement and another lost vision (HM to PL) (mean 0.8) due to radiation maculopathy.
Conclusions PBR is an effective treatment for retinal haemangioblastomas with good regression of tumours; side effects are fewer and less severe than that reported with external beam radiotherapy, however our rates of radiation maculopathy were >40% despite a dose of 18Gy. Although the expense and difficulty with access may limit its use, PBR ought to be considered in refractory cases unresponsive to alternative therapies, and in juxtapapillary lesions where alternative treatments cause rapid and severe visual loss.

• 4445

Case report of a choroidal ganglioneuroma

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Purpose To describe an extremely rare ganglioneuroma of the choroid.
Methods A 68 y old man was referred for longstanding retinal detachment on his right eye. There was loss of vision to less than 0.01 without pain or trauma. The left eye was normal. He was in normal good health. A retinal detachment with subretinal mass mid-peripheral was detected and a metastatic disease was the most probable diagnosis. After general investigations and full body scan, no other suspicious tumors were found. After consultations the patient choose to have his eye enucleated and the eye was sent for histopathology.
Results Pathology examination revealed a broad and flat choroidal tumor consisting of mature nerves and ganglion cells. A retinal detachment with atrophy of photoreceptor layers, and large zones with hemorrhage were present. There were no signs of atypia, pleiomorphisme or malignancy remarked. The abnormal tissue stained positive with S100, neuron specific enolase, neurofilamnet and synoptophysine. Ki67 was negative.
Conclusions An unexpected diagnosis of benign ganglioneuroma of the choroid was established. This is an extremely rare tumor an a non-Neurofibromatosis-1 adult man.

• 4446

Choroidal metastasis from thyroid cancer: a case series

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Purpose To describe the clinical features, treatment, and outcome of primary thyroid cancer patients with choroidal metastases.
Methods A retrospective observational case series of 3 consecutive thyroid cancer patients with choroidal metastasis in the Ocular Oncology Service, Helsinki University Hospital, Finland, from 2009 to 2015
Results The median age at presentation with primary thyroid carcinoma was 45 years. Two primary tumors were medullary and one was a papillary carcinoma. All patients had synchronous metastases to various tissues, and the choroidal metastasis from a papillary carcinoma was the first sign of cancer. The choroidal metastases from the medullary carcinomas developed 4 and 15 years after diagnosis. Two patients had unilateral and one bilateral choroidal metastases. The median tumour height was 1.9 mm and all were 10-12 mm by largest basal diameter. The primary cancer was treated with radiotherapy and thyroidectomy in 2 who also received systemic chemotherapy and sorafenib. The choroidal metastases permanently vanished with 40 Gy external beam radiotherapy. The patient with papillary carcinoma died within 4 months from cerebral metastases, whereas the two with medullary carcinoma survived 34 and 45 months from detection of choroidal metastasis and 7 and 17 years from detection of the primary tumor with synchronous metastases.
Conclusions The choroid is not a common site for metastatic thyroid carcinoma: to the best of our knowledge, there is only one previous series with three affected patients although in addition there are about 50 single case reports.

• 4447

Management strategies in vasoactive proliferative tumor of the retina

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Purpose Vasoactive proliferative tumor of the retina is extremely rare in children. Our purpose is to report the clical characteristics and management stratregy in this rare tumor of the retina.
Methods Case Report
Results A 12 years-old female was presented with decreased vision on her left eye. The vision was 20/20 on OD and counting fingers at 1 meter on OS. There was marked retinal edema and exudation at presentation. Full systemic evaluation was performed without any evidence of systemic disease. There was also no other ocular disease. On fundus examination there was telenigectatic vessels adjasent to peripapillary retina. Previous attempts of intravitreal antiVEGF bevacizumab injections elsewhere did not improve the vision and macular edema. The patient had marked retinal fluid at presentation and we decided to try intravitreal dexamethasone implant (Ozurdex) in treatment. The vision improved significantly right after the treatment but the patient developed cataract after two Ozurdex applications. After phacoemulsification with IOL implantation we were able to apply laser photocoagulation as the retinal fluid is resolved significantly and the vision improved to 20/40 after three Ozurdex applications.
Conclusions Vasoactive proliferative tumor is extremely rare in children. Our case indicates that intravitreal dexamethasone implant (Ozurdex) is effective in resolution of subretinal fluid in such cases and this treatment modality gives a window to apply destructive laser over the lesion to prevent recurrences of macular edema.

• 4461

AON therapy for restoration of defective splicing in genes mutated in hereditary blindness

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Abstract not provided

• 4462

Exploring strategies to overcome the inner limiting membrane as a barrier for non-viral retinal gene therapy after intravitreal injection

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Abstract not provided

• 4463

Copy number variation analysis and whole exome sequencing of three unique Belgian keratoconus families

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Abstract not provided

• 4464

Regenerating the ocular surface using standardized, xeno-free, tissue-engineered conjunctival grafts for conjunctival reconstruction

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Abstract not provided

• 4465

Targeting specific pathways to enhance human corneal endothelial proliferation in vitro

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Abstract not provided

• 4466

Automated retinal vessel analysis to improve the detection and management of ophthalmic and systemic diseases

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Abstract not provided

• 4467

Hidden genetic variation in retinal dystrophies – exploring the contribution of copy number variations

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Abstract not provided

• 4468

Confocal and optical coherence bleb imaging pre-and after filtering surgery

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Abstract not provided

Posters

• T001

Normal Values for Amplitude of Accommodation among a Population of High School students in Iran

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Purpose To determine the normal values for amplitude of accommodation in a population of high school students in Iran.
Methods In a cross-sectional study, sampling was done from high school students in Kermanshah, Iran through a multi-stage cluster sampling method. Eye examinations included ophthalmoscopy, refraction, visual acuity, amplitude of accommodation (AA) and cover test . Amplitude of accommodation was measured with Donder's push-up method using Royal Air Force (RAF) near point rule. Examinations were performed on-site at each sampled high school.
Results Of the 1070 selected students, 901 were included in the study. Mean age of the subjects was 14.4 ±1.7 years and mean AA was 11.53 ±3.02 diopters (D) (range, 5 to 28.5D). Mean AA was 15.33D in 11-year-olds and significantly decreased with age until it reached 10.40D in the 17-year-old age group. Mean AA in boys and girls were 10.09 ±2.48D and 11.65 ±3.03D, respectively. Based on the multiple linear regression model, younger age (coef=-0.774) and female gender (coef=1.060) significantly associated with AA magnitude.
Conclusions The results of this study indicated that the normal values of AA magnitude is lower in Iranian teenagers than that calculated with the Hofstetter's formula. It is important to take account of this point when making diagnostic and therapeutic decision.

• T002

Aberrations, accommodation and pseudoaccomodation in myopia and hyperopia

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Purpose A comparative study of accommodation, pseudoaccommodation and higher order optical aberrations (HOA) in young people with myopia and hyperopia
Methods 39 myopic eyes (averagely -5.2±1.5 D) and 53 hyperopic eyes (averagely +3.1±1.15 D) of 46 patients aged 5-20 years (mean age 11.6±0.6 yrs) were examined. Objective accommodative response (OAR) was measured on Grand Seiko Binocular Open Field Auto ref/keratometer WR-5100K. Aberrometry was conducted on OPD-Scan III (Nidek). Relative accommodation reserve (RAR) were measured. The amplitude of pseudoaccomodation was determined as the difference between the calculated additional plus lens of 3.0 D and the power of the minimum plus lens which allowed reading in cycloplegic conditions (1% cyclopentolate hydrochloride x2) at the distance of 33 cm.
Results OAR and RAR were significantly higher in hyperopic patients (-2.2±0.07 D and -3.0±0.17 D; respectively), as compared to myopic ones (-1.8±0,09 D, P<0.01, and -2.2±0.11 D, P<0.05; resp.). Total HOAs measured with a pupil 4 mm wide: root mean square, vertical coma, spherical aberrations, as well as pseudoaccomodation were significantly higher in myopic patients (0.5±0.05 D; -0.05±0.01 D; 0.15±0.05 D; 0.9±0.1 D resp.) in comparison with those in hyperopic patients (0.37±0.03 D; -0.003±0.01 D; 0,04±0,01 D; 0.6±0.1 D resp., P<0.05). Corneal spherical aberrations were measured to be 0.1±0.03 D in myopic and 0.03±0.04 D in hyperopic patients (P<0.05).
Conclusions OAR and RAR are lower in myopia compared with hyperopia. Root mean square and some HOAs are higher in myopia, which probably accounts for higher pseudoaccomodation values in myopic patients.

• T003

Correlating myopia severity with visual performance in a young Asian male population

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Purpose To examine the visual performance in a young Asian male population with severe myopia.
Methods A cross-sectional study of right eyes of 564 severe myopes [Spherical Equivalent (SE) ≤-6.00 D] and 148 emmetropes (SE -0.50 to +1.00 D). The severe myopes were categorised into three groups (Group 1: SE -6.00 to >-8.00D; Group 2: SE -8.00 to >-10.00D; and Group 3: SE ≤-10.00D). Multivariate regression analyses adjusting for age and ethnicity were performed to examine the relationship between Corrected Distance Visual Acuity (CDVA) [photopic, mesopic and Night Vision Goggles (NVG)] and Contrast Sensitivity (CS) (mesopic and NVG) with SE and Axial Length (AL).
Results The mean age of subjects was 21.07±1.17 years and majority were Chinese (91.9%). The mean SE was 0.10 ± 0.23D for emmetropes and -8.76 ± 2.04D for severe myopes (p<0.001). Higher degrees of myopia were associated with reduced CDVA and CS and increased AL (all p<0.001 among groups). Among the severe myopes, Group 1 had the highest proportion of subjects with good CDVA (photopic ≥6/6, mesopic ≥6/6, and NVG ≥6/7.5 LogMAR) and CS (mesopic ≥0.75 and NVG ≥0.35 LogCS) compared to Groups 2 and 3 (all p<0.001). Among severe myopes with good VA (photopic ≥6/6, mesopic ≥6/6, or NVG ≥6/7.5 LogMAR), Group 1 also had the highest proportion of subjects who achieved mesopic CS of ≥0.75 and NVG CS ≥0.35 LogCS (both p<0.001). Multivariate analyses also demonstrated that reduced VA and CS were significantly associated with decreased SE and increased AL (all p<0.001).
Conclusions Higher degrees of myopia are associated with reduced VA and reduced CS.

• T004

Difference between manifest and cycloplegic refraction in healthy non-presbyopic patients

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Purpose To study the variation of objective refraction between manifest and cycloplegic conditions in healthy myopic patients younger than 40 years.
Methods Sixty-six myopic eyes of healthy patients under the age of forty years were included in this study. Manifest refraction,mean corneal power, white-to-white measurement, pupil diameter, central corneal thickness and anterior chamber depth weremeasured. Following the evaluation, 1% cyclopentolate was applied to induce cycloplegia and autorefractometer refraction was determined again. A statistical analysis was accomplished to investigate the relation ofthe mentioned parameters with the variation between manifest and cycloplegic refraction.
Results Twenty-eight eyes showed no difference between non-cycloplegic and cycloplegic refraction.Thirty-eight eyes presented a relevant difference (over 0.5D) between both measurements. The statistical analysis showed no differences between these two groups in age, non-cycloplegic refraction, keratometry, white-to-white, central corneal thickness or anterior chamber depth. The only significant difference found between groups was the pupil diameter. Those patients with smaller pupil diameters presented greater changes in refraction. On the contrary, patients with wider pupils had negligible changes of refraction.
Conclusions According to our outcomes, not only hyperopic patients and children, but also myopic patients may require refraction assessment under cycloplegic conditions when autorefraction is used,since many of them show a significant modification with respect to manifest refraction. Our results show a relation between this change in autorefractometer refraction with and without cycloplegia and the pupil diameter.

• T005

The Impact of efferent oculomotor signals on size and distance perception

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Purpose To demonstrate the influence of efferent oculomotor signals on perceived size and distance of visual objects. .
Methods By fingertip, a pencil target has to be localized. The target is seen at 25 cm of distance on a 45° mirror mounted in front of the subject. With the finger behind the mirror, the subject is deprived from visual feedback. Observation is done either by naked eye or by looking through binocular prisms of 6 pdpt b.i.. The fingertip estimate is recorded by an ElGuide® ultrasound position control system (Zebris Medical, Isny, Germany)
Results In first results, the prisms produced a mean 25% overestimation of target distance as recorded by fingertip position. The target appeared visibly larger. This prompted us to do trials with a minus -3 dpt lens instead of prisms, forcing the subject to overaccommodation. Hereby, the target appeared visibly smaller and more distant, but now, fingertip pointing ends up at reduced distance.
Conclusions With reduced convergence the object appears larger and nearer. The distance of the object is over-estimated by fingertip localization. Hyperaccommodation results in a smaller and more distant appearance of the object, but its fingertip distance is underestimated. Sense and purpose of these contradictory effects are not yet well understood. Visitors of the poster are encouraged to self experience.

• T006

Early hydroxychloroquine retinal toxicity enhanced by multifocal electroretinogram and laser flare-cell meter

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Purpose The aim of this study is the evaluation of the multifocal electroretinogram (mfERG) and the laser flare-cell meter methodology (LFM) in early detection of hydroxychloroquine (HCQ) retinal toxicity.
Methods We enrolled 10 patients mean age 64.8 yrs with rheumatoid arthritis in therapy with hydroxychloroquine (400 mg/d) and cumulative dose (CD) of 625.6±167.44-g with no signs of retinal toxicity. As control group we recruited 10 health subjects mean age 61.3 yrs. MfERG (Retimax Plus, CSO, Florence, Italy) and LFM (FM-500, Kowa, Tokio, Japan) were performed in all patients and controls. The Wilcoxon signed-rank test and Spearman's correlation test was performed considering $p<0.05$ as positive.
Results Patients treated with HCQ showed compared to controls a significant amplitude reduction 0.518±0.348 μV vs 0.745±0.337 μV ($p = 0.035$) with equally significant increase in latency 38.611±2.857 ms vs. 36.334±2.212 ms ($p = 0.024$) P1 wave in ring 2 of mfERG. The alteration of dependent values of mfERG correlated to the HCQ-CD. To evaluate the behavior of the flare we divided the patients into two groups according to the CD: a group with CD> 500-g and one with CD <500-g. The CD Group> 500-g had a significant increase in flare values than the CD group <500-g: 14.4±6.266 pg/ms vs 8.1± 2.828 pg/ms ($p=0.008$). The increase in the flare on the CD group> 500 g was found to be related to the drug CD ($r=0.899$; $p=0.001$).
Conclusions We found that mfERG P1 wave implicit time in ring 2 and the flare is the more sensitive test for demonstrating retinal dysfunction from HCQ toxicity in the setting of a normal fundus with a normal authomated visual field 10.2 and normal visual acuity. The increase in the flare would indicate not only a damage to the iris and cliary body pigmented cells but also an enzyme-based breakdown of the blood retinal barrier directly caused by HCQ.

• T007

Analysis of macular sensitivity using multifocal electroretinogram and microperimetry in Central Serous Chorioretinopathy patients after half-dose photodynamic therapy

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Purpose To evaluate macular functional changes using multifocal electroretinography and microperimetry after half-dose photodynamic therapy with verteporfin (HD-PDT) in acute and chronic central serous chorioretinopathy (CSC) patients
Methods The charts of 101 CSC patients submitted to half-dose PDT were reviewed. A total of 117 eyes with acute or chronic CSC underwent half-dose PDT using 3mg/m2 verteporfin infused over 10 minutes. Serial recordings of BCVA using the ETDRS charts, macular thickness using OCT and retinal sensitivity using both microperimetry (MP) and mfERG were performed at baseline and at 3, 6, 12, 18, 24, 36, 48, 60 and 72 months after treatment. A longitudinal assessment for each of these parameters and a Spearmen's correlation analysis between them was performed.
Results Compared to baseline, a significant increase in N1, P1 and N2 mean amplitudes was registered after HD-PDT, as well as a significant decrease in N1, P1 and N2 mean implicit times, both for central and peripheral rings. A correlation analysis showed significant correlations between BCVA and the first-order component of retinal response for the most central ring (<2 degrees). Significant correlations were also found between P1 implicit time and mean central macular thickness both at 36 ($P=0.030$) and 72 months ($P=0.037$). Central 4 degrees retinal sensitivity significantly correlated with N1 amplitude ratio at 72 months ($P<0.01$) and P1 implicit time differences at 6 ($P=0.013$) and 12 months ($P=0.014$).
Conclusions mfERG demonstrated an increased retinal sensitivity in PDT-treated CSC patients. Changes in BCVA, central macular thickness and central retinal sensitivity significantly correlated with the mfERG responses. HD PDT treatment improved both structural and functional outcomes and mfERG is an important objective parameter to evaluate functional changes in follow-up.

• T008

Combination of global electroretinogram and sd-oct in the etiology of infantile nystagmus

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Purpose To study the combination of global electroretinogram (ERG) and SD-OCT in the etiology of infantile nystagmus.
Methods Sixteen children with infantile nystagmus, and no evident etiology in the normal ophthalmic examination underwent ERG with ISCEV guidelines and SD-OCT.
Results Median age was 8.7±2,9 years (3.4- 14.6 years). ERG and SD-OCT were both normal in 6 children. In 9 children, ERG showed cone dysfunction and OCT allowed differentiation between achromatopsia in 4 children and cone dystrophy in 5 children. Two children had rod and cone dysfunction in ERG and OCT was normal. Dysfunction in inner-layer retina was found in one child who had X-linked juvenile retinoschisis diagnosed with OCT.
Conclusions ERG is useful in the etiologic diagnosis and prognosis of infantile nystagmus. Its combination with SD-OCT allows better characterization of the etiology of nystagmus especially in diseases involving the macula which may guide molecular study, help performing genetic counseling, and facilitate future gene therapy.

• T009

Onset-offset visual evoked potentials in the diagnosis of ocular albinism in infantile nystagmus

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Purpose To study the contribution of onset-offset visual evoked potentials (VEP) in the diagnosis of ocular albinism in infantile nystagmus.
Methods case report
Results Observations: Two girls aged respectively three-year old and six-year old presented with infantile nystagmus. Ophthalmic examination showed visual acuity of 2/10 bilaterally, a brown iris, with positive transillumination and depigmented fundus without any other depigmentation of skin or hair. Flash VEP showed probable crossed asymmetry of P2 amplitude. P100 wave was unrecordable in 60' Pattern VEP. 60' onset-offset VEP were performed and showed evident crossed asymmetry in C1 and C2 waves which confirmed the diagnosis of ocular albinism. SD-OCT was also performed and showed foveal hypoplasia.
Conclusions Ocular albinism is more difficult to diagnose than the oculo-cutaneous albinism since it is limited to ophthalmic manifestations. Onset-offset VEP are very useful in nystagmus patients because they are less sensitive to ocular oscillations and showed more evident crossed asymmetry than flash or pattern VEP.

• T010

Are Currently Available Tests Satisfactory for Color Vision Assessment?

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Purpose We aimed to investigate the ophthalmologists' color vision test usage habits and thoughts on whether it meets the needs of their demands in clinical practice.
Methods A 8-item questionnaire was applied to ophthalmologists who have interested in color vision tests in daily practice. The questionnaire was applied to the participants through face to face fashion or by mail.
Results A total of 70 participants (50 male, 20 female) with a mean age of 36.8 years were completed the questionnaire. Mean professional experience of the participants was 9.6 years. Almost all of the participants (97%) were using Ishihara pseudoisochromatic plates in daily clinical practice. The Farnsworth-Munsell 100 hue test was preferred by only 2 (3%) ophthalmologist. However, 84.3% of the participants believe that Ishihara pseudoisochromatic plates do not meet their needs at least partially. Seventy four percent of ophthalmologist (n=52) thought that there is a need for new color vision test providing more detailed data of the subjects.
Conclusions Most of the ophthalmologists still use Ishihara pseudoisochromatic plates for color vision assessment in their routine practice. However, they thought that it does not meet their needs and believe that a new computer based color vision test is essential for the detailed examination of the patients with color vision deficiency.

• T011

The Effect of Sports Participation on Quality of Life in Subjects with Low Vision

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Purpose The aim of this study was to determine the effect of sports on quality of life in subjects with low vision. It was also aimed to determine the effects of various sociodemographic variables on the quality of life in subjects with visual disability.
Methods One hundred athletes with visual loss sampled from those who participated in national games for people with visual disability and 100 subjects who did not participate in sports matched to athletes according to age, gender and visual level were included in the study. All subjects had best corrected visual acuity less than 6/60 or visual field less than 10 degrees in the better eye. Sociodemographic variables were recorded and ophthalmic examinations were performed. The Short-Form Health Survey (SF-36) was applied.
Results Age, gender, marital status, working status, the age of visual loss and visual level were similar in groups. Athletes had a higher level of education (p=0.049). Scores of all dimensions of the SF-36 were higher among athletes compared to controls. The scores of vitality and mental health were higher among men (p=0.017, p=0.008). Subjects who had a job had higher vitality scores (p=0.026).
Conclusions Sports participation improves scores of all dimensions of the SF-36 in subjects with visual disability. Success of the rehabilitation and quality of life would improve if appropriate sports are included in the rehabilitation program. Increase of the educational level and having a job improves quality of life in these subjects. Scores of some dimensions of quality of life are lower in women with visual disability. This indicates that support and rehabilitation programs for women with visual disability should be developed specifically.

• T012

Unilateral Carcinoma-Associated Retinopathy: Diagnosis, Serology and Treatment

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Purpose To report a case of unilateral CAR with clinical and ERG normalization after radical hysterectomy combined with steroids and Rituximab.
Methods Work-up included extensive clinical and electrophysiological testing. Also, serological work-up for antiretinal antibodies and oncological screening was organized.
Results A 45-year-old female presented with progressive unilateral photopsias, photophobia and relative central scotoma in the RE since 6 weeks prior. BCVA was 1.0 in BE. Biomicroscopy, IOP and fundus exam were unremarkable. Also, colour vision, AFI, OCT and EOG were normal. VFs showed decreased central sensitivity in the RE. ERG showed an electronegative combined and ON-bipolar response. A diagnosis of CAR was suspected. Radical hysterectomy was performed after a diagnosis of an undifferentiated cystic adenocarcinoma of the right ovary, followed by adjuvant chemotherapy. A whole body PET scan revealed no metastasis. Treatment with rituximab monoclonal antibodies in combination with corticosteroids was initiated. The patient tested positive for serum auto-antibodies against TRPM1, a transient receptor potential cation channel expressed in ON-bipolar cells. After treatment there was progressive improvement in symptoms and the ERG normalised. Serology confirmed complete clearance of auto-antibodies.
Conclusions Although extremely rare, unilateral CAR does occur and in cases with high clinical suspicion an oncological work-up is mandatory. Aggressive treatment combining surgery, steroids and Rituximab can lead to clinical and ERG normalization with clearing of antiretinal antibodies.

• T013

Systematic Assessment of Clinical Methods to Diagnose and Monitor Diabetic Retinal Neuropathy

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Purpose Background and Purpose:
Diabetic retinal neuropathy refers to retinal neural tissue damage occurring before diabetic retinopathy and fulfils many of the criteria for causality for the subsequent vasculopathy. Developing reliable means of measuring neuronal damage in diabetes may be important in efforts to prevent retinopathy. This study aimed to systematically assess current clinical measurements of diabetic retinal neuropathy.
Methods Methods: A systematic search of the medical literature since 1984 was performed on PUBMED and EMBASE and the evidence supporting each identified method as an indicator for clinically important diabetic retinal neuropathy was graded relatively as strong, medium or weak according to criteria assessing its relationship to subsequent diabetic retinopathy, quality of supporting studies and published reproducibility.
Results Results: The systematic search yielded 6421 results. Subsequent assessment by two independent investigators identified 601 multiple subject studies in humans assessing clinical aspects of retinal structure, function or psychophysics in the pre-diabetic retina. Clinical methods assessed as being supported by relatively "strong" evidence included FM-100 hue colour vision changes, flash ERG b-wave latency, flash multifocal b-wave latency, scotopic flash ERG oscillatory potential amplitude and contrast sensitivity.
Conclusions Conclusions/Discussions: The results showed moderately poor quality of extant evidence and indicate the best clinical methods for assessing diabetic retinal neuropathy remain to be confirmed. This is the first systematic assessment of the medical literature aiming to assess the breadth and validity of these methods and represents an early step in identifying and developing endpoints for use in trials designed to identify at risk patients or prevent diabetic retinopathy.

• T014

Long-term results of up to 6 years of mitomycin-c augmented non-penetrating deep sclerectomy for pseudoexfoliation glaucoma

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Purpose To evaluate the long-term efficacy of mitomycin-c augmented non-penetrating deep sclerectomy (NPDS) in patients with pseudoexfoliation glaucoma.
Methods In this retrospective single-center study a total of 72 eyes of 63 patients with pseudoexfoliation glaucoma were included. Perioperative and postoperative complications, additional procedures including laser goniopuncture, needling, selective laser trabeculoplasty (SLT) were recorded. Complete and partial surgical success were defined as an intraocular pressure (IOP) <18 mmHg and IOP between 18-21 mmHg with or without medications, respectively.
Results The follow-up time was 26.40±20.06 months (range 1-80). Preoperative and postoperative IOP were 26.53±7.71 and 18.69±6.58 mmHg, respectively (p<0.001). Preoperative and postoperative last visit mean RNFL were 61.82±17.54 and 62.55±17.39 micrometers, respectively (p=0.081). The success rate for the IOP of 18-21 and <18 after first year were 88% and 87%, respectively, and after second years were 88% and 71%, respectively. The success rate for the IOP< 18 after 3 years was 60%, after 4 years was 55%, after 5 years was 49%, and after 6 years was 37%. The success of NPDS is not affected by age, gender, preoperative application of SLT, cup/disc ratio, preoperative IOP and medication numbers (p>0.05). Hypotony was observed in 19 eyes. There were no serious complications including hypotony induced maculopathy, choroidal detachment, blebitis, and endophthalmitis.
Conclusions Mitomycin-c augmented deep sclerectomy is almost as effective as trabeculectomy in long-term management of intraocular pressure in patients with pseudoexfoliative glaucoma in addition with lower complication rates with its well-known excellent safety profile.

• T015

Filtering Blebs After XEN Implantation and Trabeculectomy: A Clinical and In Vivo Confocal Microscopy Study

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Purpose The aim of this study was to evaluate and compare macroscopic and microscopic morphological features of functioning filtering blebs after XEN Gel Stent (XEN) implantation and trabeculectomy.
Methods Prospective, observational case-control study of 10 eyes submitted to XEN implantation, 10 eyes submitted to trabeculectomy and 11 control eyes treated medically. A complete ophthalmological examination was performed, including Goldmann applanation tonometry, slit-lamp examination, anterior segment photography and in vivo confocal microscopy (IVCM - Heidelberg Retina Tomograph II, Rostock Cornea Module). Photographs were analyzed with Moorfields bleb grading system classification. The IVCM images were analyzed for the density of intraepithelial microcysts, the density of subepithelial connective tissue, the number, diameter and tortuousity of blood vessels and the presence of inflammatory cells. The examinations were performed from 6 to 16 months postoperatively and only blebs resulting from a surgery with total success were included (Intraocular pressure < 21mmHg without therapy).
Results The analyze of anterior segment photographs didn't showed diferences between blebs's features after XEN implantation and trabeculectomy. The IVCM showed an increase in the density of intraepithelial microcysts and subepithelial connective tissue in XEN and trabeculectomy blebs comparing with the controls (p<0.05). All morphological findings were similar when comparing the group of XEN and trabeculectomy blebs.
Conclusions Functioning blebs after XEN implantation showed similar features comparing with functioning blebs after trabeculectomy. Further longitudinal studies are needed to increase the postsurgery understanding and management of filtering blebs.

• T016

Ab Interno Collagen Stent implantation as a treatment option for open angle glaucoma

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Purpose To establish the efficacy and safety of an Ab Interno Collagen Stent (AICS) in combination with subconjunctival Mitomycin C (MMC) in patients with open angle glaucoma (OAG), in the reduction of intraocular pressure (IOP), hypotensive treatment (HT) and progression on structural retinal nerve fiber layer (RNFL) exams.
Methods Prospective, non-randomized study involving 10 eyes with OAG, not controlled by HT, submitted to AICS implantation (Xen Gel Stent, Aquesys, Calif., USA) following subconjuntival MMC, with 6 month of follow-up. Patients were reevaluated on the 1st day, 1st week and at 1st, 3rd and 6th months of follow-up. IOP and bubble dimensions were registered and the need for re-interventions or HT was analyzed. Structural RNFL evaluation was performed at 6 months (Spectralis OCT, Heidelberg Engineering, Heidelb., Germany), and compared to preoperative values. Correlation analysis was made between IOP reduction, bubble dimensions and age.
Results Mean IOP values were 21.8±5.87 mmHg, 11,4±4.5 mmHg, 13.2±3.93 mmHg; 18.1±6.9mmHg, 14,2±3.19mmHg and 13.7±3.10 mmHg and mean bubble dimensions were 3,1; 2,5; 2,5; 2,5 and 2,6 at 1st day, 1st week and 1st, 3rd and 6th months, respectively. Re-interventions were necessary in 4 cases. IOP reductions compared to preoperative values were statistically significant at all follow-up visits (p<0,05), except for the 1st post-operative month. There was a statistically significant correlation between bubble dimensions and IOP reduction (p<0.05; r=-0.788).
There was no significant progression of RNFL loss. Hypotensive medication was reduced by 87.5%. No complications were reported.
Conclusions The insertion of an Ab Interno Collagen Stent with adjunctive MMC significantly reduced IOP over a 6 months follow-up period without significant complications, notwithstanding a considerable need for re-interventions.

• T017

Trends in glaucoma surgical procedures in Portugal - a national database report 2000-2014

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Purpose To analyze trends in the surgical management of glaucoma, in Portugal, from 2000 to 2014.
Methods We performed a retrospective analysis of all episodes for inpatients or surgery outpatients in all public nationwide hospitals, with a diagnosis of glaucoma/ocular hypertension (coded 365.xx) or trabeculectomy ab externo (code 12.64) or insertion of glaucoma drainage device (GDD, code 12.67) or other scleral fistulizing procedure (code 12.69, used for GDDs prior to 2011), and analyzed associated eye procedures (ICD 9-CM codes 08.xx to 16.xx).
Results In 15 years, the total number of eye procedures was 55,081 (17.6% of all coded procedures), with an increase in the number of eye procedures from 2614 in 2000 to 5400 in 2014 (34.1% and 11.3% of all coded procedures, respectively). Overall, trabeculectomy ab externo was the second most performed eye procedure (20.6%), second only to cataract extraction with phacoemulsification. Although the absolute number per year has an almost steady profile (747 in 2000, 643 in 2014), the relative frequency of this procedure has decreased from 28.6% in 2000 to 11.9% in 2014. On other hand, GDDs had an increase both in absolute and relative values [(17 (0.7%) in 2000, steady until 2008 - 21 procedures (0.5%), and then increasing until 2014 - 327 procedures (6.1%)]. As for cyclodestruction (cryotherapy or photocoagulation), there is an increase in the total number of procedures (75 in 2000, 217 in 2014), but their relative frequency is stable throughout the study period (2.9% in 2000, 4.0% in 2014).
Conclusions Trabeculectomy ab externo remains the most widely performed IOP-lowering surgical procedure. However, there is a trend showing a reduction in the frequency of trabeculectomies, whereas there is an increase in GDD use. Cyclodestruction has a stable frequency in the number of procedures throughout the study period.

• T018

Incidence and risk factors of elevated intraocular pressure following deep anterior lamellar keratoplasty

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Purpose To report the rates of elevated IOP following deep anterior lamellar keratoplasty (DALK).
Methods A retrospective study investigating the 5-year incidence of raised IOP following DALK cases performed from 2004 to 2008 in a tertiary centre. Patients with less than 6 months of follow-up were excluded. Elevated IOP was defined as IOP>21mmHg.
Results An episode of elevated IOP occurred in 36.1% (n=44) of 122 cases, 11.4% (n=5) occurring within the first week. The average duration of raised IOP was 48.9 (SD: 65.5) days. Causes included pupil block from air, swollen grafts, and corticosteroid response. Surgical intervention to lower IOP was required in 3 (6.8%) cases. In multivariate analyses, the use of patanol 0.1% or the use of ciclosporin eyedrops before DALK (OR=14.51, 95%CI=1.43-147.23) and the type of topical corticosteroid use post-DALK (OR=4.79, 95%CI=0.73-31.52) were found to be associated with higher rates of elevated IOP post DALK. At 5 years post DALK, 3/71 cases (4.48%) developed de novo glaucomatous field defects, and 1 case with pre-existing glaucoma had progression of glaucomatous field defect.
Conclusions DALK was associated with a significant incidence of transiently elevated IOP post-operatively, but had a low incidence of de novo glaucoma at 5 years in our study. Risk factors for elevated IOP post DALK included the prior use of patanol 0.1% or ciclosporin eyedrops and the type of topical corticosteroid used following DALK.

• T019

New drainage construction in the surgical treatment of glaucoma

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Purpose In the world by far the most effective way to prevent scarring ways outflow of intraocular fluid (IOF) is the use of drains in the area of surgery. The urgency of developing a stable drainage design, providing a stable outflow of IOF and allows them to be a prolongation of the hypotensive effect.
Methods The operation was performed in 23 patients (23 eyes) with primary open angle advanced and far-advanced glaucoma aged 50-70 years, having one or more of a history of glaucoma operations. As an implant material used polyglycolide thread (PGA, Russia, 8-0, thread length 45 cm, diameter - 0.2), which is a synthetic absorbable suture composed of filaments of glycolic acid. The total absorption occurs within 60-90 days. Surgical technique. Drainage was made in the operating room by without nodular weaving of the three strands. As a result, drainage acquired cylindrical honeycomb structure and a length of 4 mm and a diameter of 1.5-2 mm. During the operation, they formed the superficial and deep scleral flap.
Results The duration of observation - from 3 to 9 months. When observed in the early postoperative period (2 months) to 100% (23 eyes) IOP is within 13-15 mm Hg. Art., the achieved level of IOP after 7-9 months. it persisted in 91.3% cases (21 eyes). In two case, was an increase in IOP to 26-27 mm Hg. st., which required connection instillation of antihypertensive drugs. The quality of the operation in the early postoperative period and later confirmed by ultrasound biomicroscopy; fixed function active cavity in the area of intervention without excessive proliferation.
Conclusions A variant of the surgical treatment of glaucoma with drainage design their own modifications, provides a prolonged hypotensive effect in patients with glaucoma.

• T020

EyeOP1 as a novel non-invasive surgical treatment of glaucoma: an Italian multicenter study

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Purpose To evaluate safety and efficacy of a new non-invasive ultrasound device for the surgical treatment of glaucoma.
Methods This is a multicenter prospective study conducted at the University of Bologna and Genoa including 30 eyes of 30 patients with uncontrolled glaucoma. Of these, 15 patients were affected by primary open angle glaucoma (POAG), 10 by angle closure glaucoma (ACG) and 5 by neovascular glaucoma (NVG). The procedure was performed by an ultrasound generator probe with 6 piezoeletric transducers activated for 4, 6 or 8 seconds (EyeOP1, EyeTechCare, Rillieux-la-Pape, France). Intraocular pressure (IOP) measurements were performed before and 1 day, 1-2 weeks, 1-3-6 months after the procedure. Primary outcomes were mean IOP reduction, qualified success (IOP reduction ≥20% without hypotensive medication adjunction) and complete success (as above plus IOP<21 mmHg). Secondary outcomes were the correlations with glaucoma subtypes and exposure treatment time.
Results The mean pre-operative IOP was 30.1 mmHg (mean numbers of hypotensive drops and acetazolamide tablets were 2.7 and 0.8 respectively). Six months after treatment, mean IOP value was 20.2 mmHg (mean number of hypotensive drops and acetazolamide tablets were 2 and 0.3 respectively). IOP reduction was significant regardless glaucoma subtypes and exposure time ($p<0.001$). In particular, higher IOP reductions were found in patients affected by ACG or treated with 8 seconds exposure time (always $p<0.05$). Qualified success was reached in 18 eyes, complete success in 6 eyes. Two patients had no IOP reduction with the need of subsequent surgery or increased number of drops. No major complications occurred.
Conclusions This procedure appear to be safe and effective in reducing IOP in all glaucoma subtypes. In particular, IOP reduction was shown to be higher in ACG and 8 seconds exposure groups.

• T021

Retrospective review of pressure reducing effect of iStent and Trabectome procedures combined with cataract surgery

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Purpose To evaluate the intraocular pressure (IOP) reducing effect of cataract operation combined with either trabecular bypass microstent (iStent) implantation or internal trabeculectomy (Trabectome).
Methods A retrospective interventional case series involving 61 eyes who underwent cataract surgery combined with either iStent implantation or Trabectome. Outcomes included short term (1-3 months) and long term (6-12 months) changes of intraocular pressures and number of glaucoma medications.
Results For all cases, mean preoperative IOP of 19.9 ± 5.2 mmHg decreased by 17% to 15.8 ± 4.9mmHg short term and by 12% to 16.4 ± 3.73 mmHg long term. For iStent cases, short term and long term IOP reduction was 21.7% and 17.7%, respectively (from 20.6 ± 6.3 mmHg to 15.2 ± 3.3 and to16.5 ± 3.8 mmHg). For Trabectome cases, short term and long term IOP reduction was 14.6% and 10.5%, respectively (from 19.5 ± 4.5 mmHg to 16.2 ± 5.7 and to 16.4 ± 3.8 mmHg). Long-term IOP changes were significant in both subgroups ($p<0.005$). There was no significant change in the number of glaucoma medications in either groups (2.0 ± 1.1 preoperative, and 1.7 ± 1.3 long term postoperative for all cases, $p=0.09$.)
Conclusions Cataract surgery combined with iStent or Trabectome provided a significant but only modest reduction in intraocular pressure.

• T022

Canaloplasty with Stegmann's Canal Expander® for Open-angle Glaucoma

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Purpose To evaluate the surgical outcome of canaloplasty using Stegmann's canal expander in open-angle glaucoma (OAG).
Methods Prospective, non-comparative, interventional study. We recruited patients with uncontrolled OAG. All cases were operated by the same surgeon using a standardized canaloplasty procedure with 360-degrees dilatation of Schlemm's canal (SC) using a flexible ophthalmic microcannula followed by the insertion of the expander into both surgically created SC ostia. Primary outcomes: mean change in intraocular pressure (IOP) and number of glaucoma medications following surgery. Secondary outcomes: complication rates; percentage of eyes with successful insertion of the expander in SC.
Results 44 eyes of 42 consecutive patients included. 38 (86%) were Caucasians; 32 (73%) female; primary-, pseudoexfoliative-, pigmentary- OAG had 25 (57%), 17 (39%), 2 (4%) respectively; 30 (68%) were pseudophakic; mean age (±SD) was 77 ± 8 years. All patients reached month-6 follow-up visit (range: 6-24). Mean IOP decreased from 22.4 ± 7.8 mmHg before surgery to 8.4 ± 4.2, 12.05 ± 3.59, 11.07 ± 4.08, 11.3 ± 3.51, 11.2 ± 2.6, 11.1 ± 2.7, 11.6 ± 2.3 at day-1, week-1, month-1, -3, -6, -12, -24 respectively ($p < 0.01$). Mean number of glaucoma medications reduced from 3.36 ± 0.74 before surgery to 0.15 ± 0.47 at the last recorded visit ($p < 0.01$, Wilcoxon). No complication was recorded in 20 eyes (45%); a spontaneously-resolving hyphema in 14 (32%); a choroidal detachment in 4 eyes (9%); a Descemet's membrane detachment and anterior uveitis each in 3 eyes (7%). Uneventful insertion was achieved in 29 eyes (66%). The stent was trimmed in 2 eyes (4.5%) due to some resistance during insertion and it was inserted only in one side in 8 eyes (18%).
Conclusions Canaloplasty with Stegmann's expander appears to reduce IOP in OAG with minor and self-limited complications.

• T023

Ultrasound evaluation of Ahmed Glaucoma Valve: IOP versus tube patency

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Purpose Refractory glaucoma remains a challenge to be treated with surgical techniques. This study evaluated long-term results of Ahmed glaucoma valve (AGV) implantation in treating refractory Glaucoma using intraocular pressure (IOP) and B-scan ultrasound assessment.
Methods This retrospective study was conducted on patients with refractory glaucoma treated with AGV implant. 60 eyes of 60 patients with a follow up of 36.3 (SD 9.6) months were analyzed. Outcome measures included: IOP, patency of the tube assessed by ultrasound, number of glaucoma medications, and postoperative complications. Success was defined as IOP ≤ 21 mmHg with at least 25% reduction in IOP compared to preoperative values, and tube patency +/- glaucoma medications.
Results Mean IOP was reduced from 33.1 (SD 11.8) to 16.2 (SD 5.4) mmHg, ($p< 0.0001$), with a mean reduction of 49.36%. 12 eyes of 60 (20%) showed tube partially non patent with 9 eyes presenting IOP >21 mmHg. The percentage of success was 76.6% with 17 patients (28.3%) showing postoperative complications, as hyphema and shallowing of the anterior chamber. The mean number of preoperative anti-glaucoma medications (3; SD 1) was reduced compared to the mean number of postoperative medications (2; SD 1.), ($p <0.0001$).
Conclusions The Ahmed glaucoma valve implant was highly effective in the long term for treating refractory glaucoma. B-scan ultrasound evaluation showed to be a useful technique for evaluating tube patency/function in eyes with refractory glaucoma.

• T024

Macroscopic analysis of filtering bleb functionality after XEN Gel Stent implantation with Anterior Segment Optical Coherence Tomography

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Purpose The new approach of Micro invasive Glaucoma Surgery, XEN Gel Stent is made of soft collagen and it is introduced by a corneal incision, trough the anterior chamber angle and it stands under the conjunctiva space.
To study the bleb macroscopic morphology with Anterior Segment Optical Coherence Tomography and correlate it with the clinical evaluation.
Methods Prospective case-control study with 10 eyes of 8 patients with the range follow-up to 6 months after XEN Gel Stent implantation. Two groups were characterized according to the clinical evaluation (Intraocular Pressure, topical treatment or additional procedures, as YAG-LASER and Needling). Group 1 describes those patients with IOP under 21 mmHg without topical treatment even if it was necessary an additional YAG-LASER or needling (n=8). Group 2 was formed with IOP above 21 mmHg or under 21mmHg with topical treatment (n=2). The parameters analyzed were the bleb structure (diffuse or cystic), extension (height, width and length), chamber angle aperture and tube extension (anterior chamber and scleral).
Results The group 1 appears to be with indifferently diffuse or cystic higher extensions of filtering blebs than those in group 2. The structural analysis with OCT was concordant with the macroscopic morphology in slit lamp evaluation. The tube extension in anterior chamber and under conjunctiva and its chamber angle entrance was relatively variable over all patients.
Conclusions The clinical assessment of the filtering bleb has proved a significant concordance with the filtering bleb macroscopic morphology in the AS-OCT. Additional longitudinal studies about this topic will be necessary to improve the knowledge and the surgeon's management capabilities.

• T025

Trabeculectomy: long term visual field stability

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Purpose Evaluation of 10 year visual field (VF) stability following trabeculectomy for open angle glaucoma (OAG).
Methods Consecutive visual fields (VFs) of patients who had undergone primary trabeculectomy for OAG were reviewed for evidence of glaucomatous progression. Progression rate was determined by the difference between the better of the last two Mean Deviations (MDs) and the better of the first two MDs (or first and last MD if <4 VFs were available), divided by time. <0.3dB/year was classified as stable, ≥0.3dB/year as borderline progression and ≥0.5dB/year as definite progression. Eyes with <3 reliable VFs over <2 years were excluded.
Results 143 eyes (120 patients) underwent trabeculectomy; 84 (66 patients) met the inclusion criteria. Mean follow-up was 11.2 ±1.71 years; IOP (mean ±SD) at final review was 11.5 ±4.2 mmHg. Mean progression rate was 0.14dB/year; 66.7% (56/84) eyes were stable, 15.5% (13/84) showed evidence of borderline progression and 19% (16/84) definite progression.

Of those with definite progression, 62.5% (10/16) failed to achieve good IOP control post-operatively (final IOP was >13mmHg) or had VF loss attributable to causes other than glaucoma. Only 6 (7.1%) eyes progressed despite good IOP control.
Conclusions In the majority of cases, current trabeculectomy surgery can achieve VF stability or markedly curtailed progression for at least 10 years.

• T026

Augmentation of corneal graft tissue with UV-riboflavin crosslinking: a pilot study in glaucoma drainage device patients

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Purpose Glaucoma drainage device (GDD) surgery has gained popularity, with outcomes equivalent to trabeculectomy in some studies. However, erosion of the tube through the overlying conjunctiva may occur in 5-10% of patients. Donor cornea tissue has been utilized as a patch graft for GDD surgery, with positive short-term results. We report interim results of an ongoing pilot study to determine the feasibility and safety of utilizing the anterior lenticule from Descemet's Stripping Automated Endothelial Keratoplasty (DSAEK) corneas, with augmentation by corneal crosslinking.
Methods Prospective study of 10 patients undergoing GDD surgery. The anterior corneal lenticule (300-350 microns) from a DSAEK donor tissue was placed epithelial side down in a well, and allowed to soak in riboflavin solution (Vibe-X, Avedro) for 15 minutes. Then 8mW/cm2 ultraviolet irradiation was applied for 15 minutes, for a total energy of 7.2J/cm2. The tissue was then bisected and placed in Optisol GS media at 4° C. When ready to be implanted, the tissue was sutured over the glaucoma device, then covered with recipient conjunctiva as per the usual technique. Representative sections were examined with H&E and Masson Trichrome histological stains. Intraoperative and postoperative findings and complications were documented, with all subjects reaching the 3 month visit of an anticipated 36 month study.
Results After 15 minutes the grafts demonstrated complete saturation with riboflavin. Histology revealed no apparent demarcation line, supporting a full-thickness treatment effect. There were no intraoperative complications, no postoperative infections, and no unexpected surgical difficulties.
Conclusions UV-riboflavin crosslinking of corneal tissue appears to be a safe modification of GDD surgery, and warrants ongoing study.

• T027

Case-finding for angle closure: the diagnostic value of simple tests for estimating limbal and central anterior chamber depth

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Purpose To evaluate the diagnostic accuracy of limbal and central anterior chamber depth measurement for detecting gonioscopically narrow anterior chamber angles (ACAs).
Methods A total of 78 subjects with narrow or open ACAs underwent an assessment of anterior chamber depth at the temporal limbus by estimating depth as a percentage of peripheral corneal thickness (van Herick test) by one examiner and just-touching-slit-length measurements of the central anterior chamber depth (Smith's test) by a second examiner. Diagnostic performance was compared with (a) a gonioscopy reference standard, performed by a third examiner using the International Society of Geographical and Epidemiological Ophthalmology (ISGEO) definition of primary angle closure and (b) a classification based on clinical opinion of occludability. All examiners were masked regarding each subject's clinical status and other test results. Sensitivity, specificity, and partial area under the receiver operating characteristic curve (AUROC) were generated.
Results The van Herick grading cutoff of 25% or less and ISGEO gonioscopic classification achieved 80% (95% CI 65 to 89) sensitivity and 92% specificity (95% CI 80 to 97) for narrow angle detection, with specificity reaching 97% (95% CI 87 to 100) for a cutoff of less than or equal to 15%. Notably, with a gonioscopic classification based on clinical opinion of occludability, van Herick (≤25%) together with Smith's test (≤2.50 mm) detected 100% of narrow angle subjects.
Conclusions The van Herick test provides good discrimination between narrow and open angles both alone, and in combination with the measurement of central anterior chamber depth. These tests show good potential for identifying individuals who may benefit from further gonioscopic assessment in a case-finding or screening setting.

• T028

Integrated visual field and relative risk for quality of life loss

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Purpose To assess cut-point values of the integrated visual field (IVF), and their relative risk, associated with a higher risk for quality of life (QoL) loss.
Methods 489 subjects were included. 51healthy and 438 glaucoma patients. IVF was calculated from monocular visual field, best location method. IVF score (IVFS) was calculated (Crabb). IVF was divided into six zones. All subjects completed three different questionnaires. Global quality of life was evaluated with EuroQol-5D (EQ-5D). Vision related quality of life was assessed with Visual Function Questionnaire (VFQ-25) and with ocular surface disease Index (OSDI). ROC curves were built and cut-point for best sensitivity and specificity values were calculated. Relative risk for suffering bad QoL was also assessed for each dimension with a ROC area > 0.6
Results IVFS ≥ 3 was associated with a worse QoL related to general vision with a relative risk (RR) of 3.19. IVFS ≥ 5.5 was associated with a worse QoL related to color vision and mental health with a RR of 2.79 and 1.91, respectively. IVFS ≥ 6.5 was related to worse QoL related to dependency with a RR of 2.40. IVFS ≥ 9.5 was associated with a worse QoL related to ocular surface disease with a RR of 2.86. IVFS ≥ 10.5, 12.4 and 14.5 were associated with a worse QoL related to general vision, distance activities and peripheral vision, respectively, with a RR of 3.19, 3.30 and 2.86, respectively. All these RR had p <0.05. IVF was divided into six zones, and OSDI and the same dimensions of VFQ-25 presented the ROC areas > 0.6. Risk for loss in QoL was related to a mininum decrease in IVF in central zones and required greater loss in the peripheral zones.
Conclusions Higher values of IVFS and small deficits in central IVF are associated to two or three folds risk of having loss of QoL in glaucoma patients.

• T029

Ultrasound treatment in patients with Primary Open-Angle Glaucoma with a second generation probe: Results of a Multicenter Clinical Trial

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Purpose To evaluate the efficacy and safety of the Ultrasound Ciliary Plasty (UCP) procedure with a second generation probe.
Methods Fifty-two eyes of 52 patients with primary open-angle glaucoma were treated between April 2015 and August 2015 in 4 University Hospitals with a second generation therapy probe comprising 6 piezoelectric transducers with increased lesion volume. All patients were treated with a 8 seconds exposure time. Complete ophthalmic examinations were performed before the procedure, and at 1 day, 1 week, 3 and 6 months after. Primary outcomes were surgical success (defined as IOP reduction from baseline ≥ 20% and IOP > 5mmHg) at the last follow-up visit, and vision-threatening complications. Secondary outcomes were mean IOP at each follow-up visits compared to baseline, medication use, complications, and re-interventions.
Results IOP was significantly reduced (p<0.02), from a mean preoperative value of 24.3 ± 7.0 mmHg to a mean value of 16.8 ± 7.6 mmHg at last follow-up. Success (IOP reduction >20%) was achieved in 67% of eyes at last follow-up. Four patients were ret-treated. No major intra- operative complications occurred. Transitory hypotony (IOP<5mmHg) occurred in 3 patients, choroidal detachment in 1 patient and macular edema in 1 patient during the follow-up.
Conclusions Ultrasonic Circular Cyclo Coagulation seems to be an effective method to reduce intraocular pressure in patients with OAG. Increasing the lesion volume seems to increase the efficacy and rate of responders.

Conflict of interest
Any consultancy arrangements or agreements?:
I am consultant of EyeTechCare (Rillieux, France)

• T030

Transmission electron microscopy study of the collagens of the trabecular meshwork in glaucoma patients

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Purpose To analyze the ultrastructural features and the distribution of the collagens of the different regions of the trabecular meshwork (TM) in patients with primary open-angle glaucoma (POAG) and primary congenital glaucoma (PCG).
Methods Iridocorneal angle tissue from healthy donors and surgical specimens from trabeculectomies of glaucomatous patients were fixed with glutaraldehyde and processed for examination by transmission electron microscopy (TEM).
Results In comparison with normal eyes, both the trabecular beams and the juxtacanalicular tissue of glaucomatous eyes had changes in the size, distribution, and organization of fibrillar collagens (type I, III, V), non-fibrillar collagens (type IV), and filamentous collagens (type VI).
Conclusions The ultrastructural changes detected in collagen constituents of the trabecular meshwork impair its biomechanics and increase aqueous humor outflow resistance, thus contributing to the elevation of the intraocular pressure.

• T031

A link between diabetes mellitus and glaucoma — Danish Nationwide Study

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Purpose To determine the effect of anti-diabetic medication on glaucoma. Furthermore, to investigate if diabetic comorbidities and concomitant medications are associated with glaucoma in patients treated with anti-diabetic medication.
Methods Retrospective nationwide cohort study, spanning a 16-year follow-up period. The National Danish Registry of Medicinal Products Statistics was used to identify all claimed prescriptions for glaucoma medication and anti-diabetic drugs. Comorbidities with diabetic retinopathy and diabetic nephropathy were identified using the ICD-10 classification and the Danish National Patient Register.
Results A total of 6,343,747 individuals in the period 1996 to 2012 were included. The overall incidence rates of new-onset glaucoma were 0.07 and 0.36 per 1000 person-years for the reference population and for diabetes mellitus, respectively. Patients treated with anti-diabetic drugs at any time during the study period had a significantly higher overall relative risk of glaucoma (RR=5.11, $p<0.0001$), even when controlling for age, gender, diabetic retinopathies and calendar year-fixed effects (RR=2.05, $p<0.0001$). For patients treated with anti-diabetic drugs, we found an increased hazard for development of glaucoma in patients with diabetic retinopathies (HR=1.40) and joint complications with diabetic retinopathies and diabetic nephropathy (HR=1.40). Furthermore, we found that concomitant antihypertensive medications were associated with an increased likelihood of glaucoma overall, while treatment with β-blocker and RAS, in combination, are associated with a significantly lower risk (HR=0.87).
Conclusions Use of anti-diabetic drugs is strongly associated with use of anti-glaucomatous drugs. Diabetic complication as well as concomitant antihypertensive medications affect the risk of glaucoma in patients treated with anti-diabetic drugs.

• T032

Hemodynamic changes in eyes with early primary open-angle glaucoma measured by transpalpebral rheoophthalmography

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Purpose To evaluate the hemodynamic parameters in eyes with primary open-angle glaucoma (POAG) and early glaucomatous visual field defects (early nasal step) using transpalpebral rheoophthalmography (TR).
Methods Two groups of subjects were examined. Group 1 consisted of 56 eyes of 39 patients aged 57-79 (ave. age $M\pm\sigma = 67.33 \pm 6.78$) with POAG and early nasal step. Of these, 17 patients had POAG in both eyes. Group 2 consisted of 54 eyes of 27 patients aged 56-73 (ave. age 63.96 ± 5.54) without any eye pathology except initial cataract. Patients with any other optic disc or macular pathology, previous intraocular surgery, ocular trauma, or severe somatic pathology, were excluded from the study. All subjects underwent complete ocular and visual field examination, Goldmann intraocular pressure (IOP) measurement and TR. TR signals were registered using a specially designed tetrapolar lead system. Signal processing of TR with special software allowing automated analysis included three basic parameters: the rheographic index (RI), the period of maximum filling (PMF), and the indicator of the elastic modulus (IEM).
Results The measured IOP was 16.9 mm Hg (± 1.7) in group 1 and 14.6 mm Hg (± 2.1) in group 2. A statistically significant difference was observed between the average RI (mΩ): for group 1 ($M\pm\sigma = 14.76 \pm 3.18$) vs. group 2 ($26.44 \pm 3.31$), $p<0.05$. A slight increase in the values of other parameters in group 1 (PMF = 21 ± 3 cs, IEM = 26 ± 4 cs) as compared to group 2 (PMF = 19 ± 3 cs, IEM = 24 ± 4 cs) was observed. This may be associated with a decrease in elasticity of intraocular blood vessel walls and their sclerotic changes.
Conclusions The proposed new TR method is easy to use, highly informative and sufficiently accurate, allowing to objectively assess the changes of ocular hemodynamics, and facilitating the diagnosis of glaucoma at an early stage.

• T033

Primary Open Angle Glaucoma treated by High Intensity Focused Ultrasound (HIFU). Results at 18 months of a prospective pilot study on patients treated with the 2nd generation probe

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Purpose To assess the safety and efficacy of Ultrasound Ciliary Plasty (UCP procedure) using HIFU (high intensity focused ultrasound) with a second-generation probe which increases the treatment surface area and the firing duration in patients with primary open angle glaucoma.
Methods Prospective clinical series performed in two University Hospitals, on twenty eyes of twenty patients with primary open-angle glaucoma, treated with the EyeOP1 medical device equipped with six miniaturized cylindrical piezoelectric transducers of a new generation with an increased lesion volume. All eyes were treated with an 8-second exposure time per transducer. The main assessment criteria were safety and efficacy measured by the incidence of complications and IOP reduction. Ophthalmic examination and ultrasound biomicroscopy were performed before treatment and during clinical follow-up at D7, M1, M3, M6, M12, M18 and M24.
Results No major intra- or post-operative complications were observed during follow-up period. Clinical examination showed no lesions of ocular structures other than the ciliary body and no or few signs of intraocular inflammation after treatment. The mean intraocular pressure was significantly reduced from 29.1 ± 5.4 mmHg before treatment to 17.8 ± 6.2 mmHg at last follow-up. Five patients have needed a second ultrasound procedure and two patients a third procedure. With a mean follow-up of 18 months, success rate, as defined by an IOP reduction >20% after one or more UCP procedures was 67%. The mean IOP reduction achieved in responding patients was 44%.
Conclusions Coagulation of the ciliary body using high intensity focused ultrasound carried out with the new-generation of miniaturized transducers is a simple, well-tolerated procedure which enables to significantly reduce the intraocular pressure in patients with Open Angle Glaucoma.

Conflict of interest
Any financial support like travel accomodation hospitality etc provided to you or a member of your staff or an accompanying person?:
EYETECHCARE

• T034

Efficacy and patient tolerability of preservative-free latanoprost compared with preservative prostaglandin analogs in patients with ocular hypertension or glaucoma

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Purpose The purpose of this study was to compare the local tolerability of the preservative-free (PF) latanoprost with other preservative prostaglandin analogs (PGA) for the treatment of open-angle glaucoma and ocular hypertension.
Methods In this prospective study, until now 125 eyes of 63 patients treated with a PGA monotherapy were included and for 16 of them treatment was switched for PF latanoprost. Ocular subjectve symptoms were evaluated. Non invasive tear break-up time (NIK BUT), tear meniscus height (TMH), conjunctival hyperemia in Keratograph 5M® and intraocular pressure (IOP) were measured at baseline and 6 months after commencing treatment with PF latanoprost.
Results Mean conjonctival hyperemia was slightly higher with preservative latanoprost (1,19) and significantly higher with the preservative travoprost (1,34 ; p=0,013) and bimatoprost (1,33 ; p=0,05) than PF latanoprost (1,06). The two most frequent subjective symptoms (burning upon instillation and conjunctival hyperemia between instillations) were less reported with PF latanoprost than with other preservative PGA. After 6 months of treatment with PF latanoprost, in patients with prior travoprost monotherapy, mean conjonctival hyperemia (1,31 vs 1,13 ; p=0,04) and TMH (0,29 vs 0,32 ; p=0,04) improved significantly. In patients with prior preservative latanoprost monotherapy, TMH improved (0,31 VS 0,35 p=0,03). There was no statistical significant difference on IOP at 6 months between PF latanoprost and preservative latanoprost (16,3±3,5 vs 15,8±3,1 mmHg ; p=0,07) and travoprost (15,8±2,5 vs 15,5±1,5 ; p=0,6).
Conclusions These preliminary results show that PF latanoprost has better subjective and objective local tolerance than preservative PGA. Switching to PF latanoprost seems to maintain IOP at the same level as preservative PGA but improve ocular surface toxicity.
Conflict of interest
Any research or educational support conditional or unconditional provided to you or your department in the past or present?:
Research made with Théa

• T035

Why risking the satisfaction and the compliance of your newly diagnosed glaucoma patient? - The PASSY survey.

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Purpose Preserved latanoprost eyedrops efficacy have been demonstrated in intraocular pressure lowering. New marketed first formulation of a preservative-free (PF) latanoprost (Monoprost®) was a further step to improve tolerance. Relatively little is known about newly diagnosed patient's tolerance to their first prostaglandin treatment. That's why naive patients were included in the PASSY survey (PAtient Satisfaction SurveY).
Methods PASSY is an epidemiological, retrospective survey carried out in 6 European countries (BE, DE, NL, PT, SP, CH). Newly diagnosed OHT/glaucoma patients (naïve) treated with a preservative-free latanoprost (Monoprost®) for 3 months were included. The results of naive patients are reported here for the first time.
Results 23.8% of the total number patient (1872) were naïve patients (435) with 59% female and 41% male. Their average age was 64.2 ± 12.96 years (SD). Based on automated visual field damage, 79.1% had mild glaucoma, 17.7% moderate and 3.2% advanced. As for tolerance, 97.3% of the naïve patients declared to be satisfied (50.1%) or very satisfied (47.2%) with PF latanoprost. Mean tolerance of evaluated with a Visual Analog Scale (VAS; 0 mm: very bad tolerance – 100 mm: very good tolerance) was 86.7 ± 13.93 mm for PF latanoprost. Of those naive patients using PF latanoprost, only 1.5% developed an OSD (82.1% mild, 14.3% moderate and 1.6% severe).
Conclusions After 3 months of Monoprost® treatment, 97.3% of naïve patients were satisfied by their first PF formulation latanoprost treatment. Ocular surface disease occurred in as littel as 1.5% of naïve patients. Because glaucoma management is severely hindered by non-compliance with medication and given that PF latanoprost is now available at a modest cost, this seems like a suitable first-choice therapy for glaucoma.

• T036

High-intensity focused ultrasound cyclocoagulation: a 6-month study

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Purpose To evaluate the safety and efficacy of high-intensity focused ultrasound (HIFU) cyclocoagulation in reducing intraocular pressure (IOP) in patients with glaucoma by using a novel miniaturized delivery device (EyeOP1) after 6 months of follow up.
Methods This was an interventional study of 61 eyes of 61 patients with glaucoma. The first series of 39 patients did not receive Pilocarpine before intervention and the second series of 22 patients received Pilocarpine before intervention. All eyes were treated with 6 activated transducers operating at 21 MHz with a duration of 8 seconds. A complete ophthalmic examination was performed before the procedure and at day 1, week 3, month 3 and 6 after the procedure. Primary outcome was to evaluate intraocular pressure (IOP) at 3 and 6 months. Secondary outcomes were to assess intra- and postoperative tolerance, visual acuity, medication use, complication rates and re-interventions.
Results IOP results of months 3 and 6 will be available at November 2016. Due to increased pupil distortion and astigmatism in the first series, a second series with the use of preoperative Pilocarpine was performed. In this series, pupillometry was also performed pre - and postoperatively.
Conclusions The current study investigates the influence of preoperative Pilocarpine on the safety outcomes of this procedure.

• T037

Introducing and measuring cornea and sclera deformability parameters on the basis of Schiøtz tonometry: mathematical modeling and clinical evaluation in Primary Open Angle Glaucoma (POAG)

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Purpose To obtain additional information on the biomechanical status of the eyeball on the basis of static loading by the Schiøtz tonometer, to be applied to POAG**.**
Methods Earlier, we proposed a mechanically correct theory of Schiøtz tonometry, which represents the eyeball as a shell characterized by two elastic constants separately responsible for the cornea and the sclera properties, and used the theory here. We examined 41 patients (43 eyes) aged 55 to 72 (mean age 64±4.0 years) with non-operated POAG, including 20 eyes with early and 23 eyes with advanced stage of POAG. 15 patients with no eye pathology of the same age group served as control. The examination included differential Schiøtz tonometry using a GlauTest 60 tonograph.
Results Applicability limits are estimated for the standard relations used in processing the clinical data. Based on differential tonometry, we introduced a coefficient γ, equal to the ratio of the IOP difference to the plunger weight difference, and looked at how γ depends on the cornea and sclera stiffness and the true IOP. The γ coefficient, which mainly characterizes the scleral rigidity, was determined at 1.65±0.25 mm Hg/g for the early stage of POAG and 1.88±0.13 mm Hg/g for the advanced POAG stage, with a control group average of 1.47±0.10 mm Hg/g ($p<0.05$). On average, γ was 27% greater for the POAG patients, whereas the mean Friedenwald's rigidity coefficient only differed from the norm by 7%.
Conclusions Changes in the mechanical parameter proposed testify to changes in the elastic characteristics of the eyeball in POAG. The coefficient γ reflects individual abnormalities of the biomechanical status of the sclera for the glaucomatous eye more adequately than Friedenwald's rigidity coefficient. Practical recommendations are proposed.
The study was supported by RFBR (project No. 14-01-00475).

• T038

5-year Incidence of Lubricant Dependence in Medically and Surgically Treated Glaucoma Patients

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Purpose Chronic use of intraocular pressure (IOP) lowering medications is associated with ocular surface disease. Glaucoma surgery has also been associated with ocular surface disturbances. In this study we assess the incidence of topical lubricant use in glaucoma patients who are medically controlled or who have had glaucoma surgery over 5 years of followup.
Methods Retrospective chart review was performed for patients on medications for primary open angle glaucoma. Some of these patients required subsequent glaucoma surgery. Primary outcome measure was the incidence and onset of topical lubricant use in these patients.
Results 505 cases patients with POAG were reviewed. Mean age was 63.9 years (SD: 11.1) and 42.8% were women. 122 of these patients required a MMC-augmented phacotrabeculectomy (n=97) or trabeculectomy (n=25) over the course of followup. 5-year incidence of lubricant use was 39% in glaucoma subjects. Females were more likely to use topical lubricants (p<0.01). Incidence of lubricant use increased from 21.3% preoperatively to 71.3% postoperatively in subjects who subsequently underwent trabeculectomy or phacotrabeculectomy.
Conclusions Glaucoma medications, surgery and female gender are predisposing factors for ocular lubricant use. Notably MMC-augmented trabeculectomy and phaco-trabeculectomy increased the need for topical lubricants by more than threefold.

• T039

Effect of different lightning conditions on daily living activities of glaucoma patients

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Purpose To determine the impact of different lightning conditions on glaucoma patient's ability to perform activities of daily living.
Methods Twenty-three glaucoma patients and 8 age-matched control subjects were included. All glaucoma patients had a best corrected visual acuity greater than 20/30. Best corrected visual acuity, contrast sensitivity, monocular automated Humphrey 24-2 visual field test, and binocular visual field test were obtained from all subjects. Two tasks of daily living were evaluated: (1) Mobility performance was assessed in an artificial street (StreetLab®) by the time required to complete an established travel path (TP) and the number of mobility incidents (MI); (2) Reaching-and-Grasping performance was evaluated on a kitchen worktop in the HomeLab®. The movement onset time (MO) and the overall movement time (OM) for reaching-and-grasping the object were recorded. Trials were carried out with three lighting conditions: scotopic 2 lux, photopic 250 lux and photopic 1500 lux.
Results Glaucoma patients completed the travel path 8.8% more slowly than controls (p=0.013). Under high luminosity, all participants completed the path 3.7% and 2.7% more quickly than under low and intermediate luminosity respectively (p<0.01). The influence of light condition was not different between the glaucoma and control group (p=0.16). The number of MI was not different between both groups (p=0.65). There was no difference in average MO time between the two groups (p=0,086) but glaucoma patients had a significantly longer OM time as compared to control subjects (p<0.01). Low light condition increased the MO time for all subjects without difference between the two groups.
Conclusions Glaucoma patients had decreased performance in mobility and motor control tasks. The influence of light condition was not different between the glaucoma and control group.

• T040

Follow-up of patients treated by prostaglandins eyedrops. Preliminary results from the FREE survey.

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Purpose After lack of efficacy, local intolerance is the second reason to change glaucoma treatment. It was demonstrated that preservatives alter the local tolerability. With the newly available preservative-free (PF) prostaglandins and the launch of a PF latanoprost (Monoprost®), it is interesting to assess the evolution of ocular signs and symptoms after switch from preserved to PF glaucoma treatment. This was the objective of the FREE survey (**F**ollow-up of glaucoma patients t**R**eated with Prostaglandins **E**y**E**drops).
Methods FREE is a prospective, European, multicentre, prospective survey implemented in ophthalmological private practices in France, the Netherlands, Norway, Poland and Sweden. The study is still ongoing to recruit a total of 1400 patients. Three study visits (inclusion and two visits after 6 and 12 months) are planned. Hyperemia and patient's satisfaction with regards to tolerance are the main evaluation criteria. Other parameters are recorded: patient feeling assessment on tolerance to the current glaucoma treatment, the ocular surface diseases, the use of tear substitutes, the ocular signs, fluorescein corneal and conjunctival stainings and tear BUT.
Results The first results from the five countries will be presented here for the first time. From the first analysis of 588 patients (354 in France, 96 in Poland, 79 in Sweden, 35 in the Netherlands and 24 in Norway), clinical signs appeared to be more present with preserved eyedrops than with PF treatment and especially with PF latanoprost at the subsequent visits. The results with PF latanoprost (Monoprost®) on long term (superior to 6 months) will be presented here for the first time.
Conclusions This preliminary first results of FREE survey confirm the clinical interest of switching from a preserved to a PF prostaglandin for a better treatment tolerability and patient satisfaction.

• T041

A descriptive subgroup analysis of within hospital glaucoma referral in a tertiary center in Portugal

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Purpose Glaucoma is a progressive and irreversible optic neuropathy carrying tremendous burden in healthcare systems. The aim of our study was to characterize the population referred to a glaucoma subspecialty department (GSD) in a university hospital.
Methods We analyzed retrospectively the within-hospital referral to the GSD. Electronic medical records and referral letters between Jan-Dec 2014 were screened. Data was screened for ancillary exams, type of tonometry, number of IOP-lowering medications and extent of the disease (HODAPP classification). Statistics were performed with STATA v13.0.
Results A total of 151 patients (78 males) were referred. Mean age was 68.2 [range 18-91. Thirty-six patients (23.8%) were referred with visual field, pachimetry and OCT. Of those with a visual field, 38 (55.1%) had a mean defect >6db (of which 17 had >12dB), with 34 patients having at least two exams. In contrast, 16 (10.6%) were referred with no ancillary exam performed and 67 (50%) had all IOP measurements performed with pneumotonometry. Sixteen patients (10.6%) had a description of a gonioscopy. All patients were under IOP-lowering treatment, of which 83 (55%) were under 2 or more IOP-lowering medications. The number of patients referred with more than 80 years old was 29 (19,2%), 5 (18.52)% of which had a complete documentation of the disease. In this subset of patients, 6 (42.8%) had an advanced form of the disease.
Conclusions Better understanding of our population characteristics will lead to a more accurate referral system. In a significant part of GDS referrals there was insufficient or poor quality clinical data. Our study raises awareness on the importance of an efficient within hospital subspecialist referral, leading to economic and health gain in Ophthalmology departments.

• T042

A comparison of visual field testing with a new automated perimeter, the Compass visual field analyser, and the Humphrey visual field analyser

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Purpose To compare a new visual field analyser, Compass, that included an eye tracking and scanning ophthalmoloscopy to Humphrey visual field analyser (HFA).
Methods Prospective cross study design.
Patients were included after a complete examination : all were indemn of ocular disease except glaucoma. Visual acuity was 20/20 for each eye and spherical equivalent ranged from +3 to -3 D.
Patients were randomly assigned to one instrument. HFA was performed with a 24-2 SITA standard strategy comparable to the Compass 24-2 ZEST strategy. Both eyes were tested and 30 minutes after where screened with the other instrument.
MD, PSD and exam duration were compared for both devices using a Wilcoxon signed-rank test. Agreement was evaluated with a Bland-Altman graph for each parameter.
Results The study included 67 eyes of 30 patients. This population was decomposed as : 13 normal eyes, 28 OHT or glaucoma suspect and 26 glaucoma. Patients' demographics were (mean±SD) : age 66,3±13,0 years, pachymetry 527,6± 28,95 µm, axial length 23,73±0,99 mm, spherical equivalent -0,004±1,3 D. 65 HFA vs 62 compass visual fields were reliable (ns). Mean Deviation was equivalent for HFA and Compass instruments : -1,6±2,6 vs -1,4±2,8 dB (p=0,28). Pattern Standard Deviation was significantly higher for the Compass 3,9±2,4 vs 2,4±1,9 dB for the HFA (p<0,0001). Examen duration was also longer for the Compass 351±83 s vs 318±48 s for the HFA (p=0,0164). Bland Altman plots showed a good agreement between HFA and Compass.
Conclusions This study shows that MD and failure rate were comparable between both instruments, PSD and examination duration were slightly higher for the Compass. Agreement was good between both instruments.
As most of the patients included had already performed a HFA before, this may explain the duration difference between and should be consider in further explorations.

• T043

Efficacy & safety comparison between Cosopt & Xolamol : Branded & generic fixed combination of 2% Dorzolamide / 0.5% Timolol

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Purpose Generic drugs approved without requiring them to repeat the same safety and efficacy clinical studies done by the innovator. They have to have same active ingredients, strength, dosage forms, labelling, indications and routes of administration as the corresponding branded drugs. But they are not required to have the same excipients as branded drugs, even though excipients may account for substantial proportions of the medication, which can interfere with the pharmacokinetic and pharmacodynamics properties of active agents.
this is the first study comparing Xolamol, widely used generic in the region, with branded Cosopt
Methods recruited patients had their glaucoma medications washed out with Timolol 0.5%, then randomized to receive Cosopt or Xolamol, after 6 weeks of treatment patients crossed over to the other medication. IOP and any sign of allergic reaction were monitored during visits, and patients answered questioners about tolerability and satisfaction
Results 28 patients, age 68.1 ± 10.3
81% PACG
Group 1; eyes started on cosopt , then crossed over to Xolamol.
Group 2 started on Xolamol & crossed over to Cosopt.
IOP in group 1 & group 2; on randomization 18±7.8 & 18.7±3.8 (P=0.74).
After 6 weeks; 15.5±4.3 & 15±4.1 (P=0.77)
And 6 weeks after cross over 14.9±4.3 & 13.6±3.2 (P=0.42)
Increased conjunctiva congestion noted in group 1; 20% on Cosopt, then 30% after cross over to Xolamol. In Group 2; 46% with Xolamol & 31% with Cosopt (P=0.18), (P=0.94)
SPE seen in 14% (n=4) on Xolamol & non with Cosopt use (P=0.037)
Patient reported excellent satisfaction in 50% & 46% when used Xolamol (as first drug or after cross over), and 54% & 57% in Cosopt users (P=0.8)
Conclusions Efficacy was equivalent with both medications, but tolerability was better with branded Cosopt

• T044

Early & delayed effect of using steroid following SLT, randomised controlled trial

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Purpose To determine the effect of using topical corticosteroid in the early post-SLT period on the result of the procedure; intraocular pressure (IOP) reduction, development of postoperative uveitis and patient's discomfort level in the early postoperative period
Methods Patients underwent bilateral SLT as primary treatment or as an alternative treatment after washout of their glaucoma medications.
Following SLT one eye was selected randomly to use topical prednisolone for 1 week Post-SLT inflammation, discomfort and IOP level during the following 6 months was compared between eyes used prednisolone and eyes did not
Results 15 patients were recruited, most had POAG
Eyes were randomized between group 1 used topical Prednisolone 1% qid for 1 week following 360° SLT, the other eye was in group 2 and only used lubrications.
IOP for group 1 &2; pre SLT 24.1±2 & 24.5±3 (P=0.66),3 months following SLT 17.2±2 & 17.7±3 (P=0.75), and on final 6 months visit, 17±2 & 17.7±3 (P=0.32)
IOP reduction following SLT in group 1&2 was 7.2 & 6.8 (P=0.60)
A day after SLT 4 eyes had mild uveitis in group 1 & 6 in group 2, all cleared by 1 week
More eyes had more sever conjunctiva congestion in group2 than in group 1
one patient developed IOP increase upon using Prednisolone, IOP dropped after cessation of treatment (steroid responder)
Conclusions The use of potent steroid following SLT doesn't have an effect on the final IOP reduction, and reduced post SLT inflammation & discomfort

• T045

Use of glaucoma medications in Portugal: a cross-sectional nationwide study

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Purpose There is scarce data about antiglaucomatous prescribing patterns in Portugal. We aim to describe and analyze the nationwide prescription of glaucoma medications in Portugal in the year of 2015. Ultimately, our goal is to identify improvement opportunities for the system and the patient, in particular.
Methods Cross-sectional study. A common electronic drug prescription system is used by all hospitals and clinics in Portugal. We used this national database and included all hypotensive drug prescriptions in 2015. Demographic data, medications prescribed (in isolation and fixed combination) and healthcare related costs were provided in an encrypted form and anonymously extracted. Statistical analyses were performed using STATA 13.0.
Results A total of 236.234 subjects (56.8% women) were prescribed one or more drugs. Mean age was 71.6 ± 13.3 [range 0; 108] years. Of the ~800.000 prescriptions, 52.3% were from general practitioners and 38.7% from ophthalmologists. The most prescribed drugs were latanoprost (20.0%), timolol/dorzolamide (13.7%), brimonidine (9.0%) and timolol (8.8%). Single-dosed preparations were prescribed in significantly younger patients (mean age = 68.7 ± 0.07) than other formulations (mean age = 71.8 ± 0.01), p < 0.001. Single-agent and combination therapies accounted for 14.5€ M and 8.5€ M in costs for the healthcare system, respectively.
Conclusions This nationwide study revealed prescription's trends and disclosed the burden of the disease in terms of its medical management. A cost-effective approach in glaucoma is essential for the whole system sustainability and should be promoted by every healthcare stakeholder.

• T046

Ultrafiltration rate in hemodialysis does not affect mean ocular perfusion pressure or intraocular pressure in end-stage renal disease

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Purpose Ultrafiltration rate (UFR), the rate at which fluid is removed during hemodialysis (HD), has been increasingly recognized as a potential modifiable cardiovascular risk factor in HD patients. High UFR has been shown to promote non-physiological fluid shifts and hemodynamic instability, which may contribute to tissue ischemia. Our goal was to evaluate if changes in mean ocular pressure perfusion (MOPP) and intraocular pressure (IOP) could be related to UFR.
Methods Prospective cohort study including 16 eyes of 16 black patients (8 women) with end-stage renal disease (ESRD) under HD. Haemodynamic data and IOP (measured with Tonopen®) were obtained one hour before and after HD. MOPP was calculated as MOPP=2/3(MAP) - IOP. STATA v.13.0 was used as statistical package and a p-value of 0.05 was considered statistically significant.
Results Mean age of ESRD patients was 46.81 ± 7.72 [range 28-60] years. The mean time under HD was 17.38 ± 14.67 months. MOPP before and after HD were 52,7 ± 13.0 and 51.4 ± 13.1 mmHg, respectively. The difference between MOPP before and after HD was not statistically significant (p = 0.15). UFR applied to these patients was 673.6 ± 198.7 [range 250-1000] mL/hour. When applying a regression model, this difference in MOPP was not associated with the UFR (p = 0.56), in both crude and adjusted analysis.
Conclusions In patients with ESRD, changes in MOPP do not seem to be related with UFR. Although UFR has been claimed to be culprit of tissue ischemia, still ill-defined vaso and barorregulatory mechanisms may play a role in protecting the eye from ischemia during this hemodynamic challenge.

• T047

Dexamethasone induced glaucoma as part of chemotherapy for lymphoblastic lymphoma and colorectal cancer

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Purpose To describe glaucoma in an eleven-year-old girl and exacerbation of glaucoma in a 59 year old man after high dose oral corticosteroid chemotherapy.
Methods Topical steroids are well known to cause intraocular pressure (IOP) elevation, but oral steroids are less commonly associated. We report 2 cases of significant IOP elevation after high dose dexamethasone treatment as part of chemotherapy for lymphoblastic lymphoma in an eleven-year old girl, and for metastatic colorectal cancer in a 59-year old man.
Results A week after induction with dexamethasone combination chemotherapy an 11-year old girl presented with headaches, photophobia and blurring of vision. Intraocular pressures were 48 mmHg and 52 mm Hg in the right and left eye respectively with bilateral arteriolar disc pulsation. Control of IOP was achieved through topical and systemic treatment but requiring renal support after systemic carbonic anhydrase inhibitor use. The second patient was an adult male with preexisting glaucoma controlled medically in the right eye and with an aqueous shunt in the left eye. During the course of chemotherapy with systemic dexamethasone for colorectal cancer he presented to casualty with reduced right vision from 6/12 to 6/60 associated with an IOP of 42 mm Hg in the right eye, while the left was 21 mm Hg. His right eye required cyclodiode laser for IOP control.
Conclusions These cases illustrate that high dose systemic dexamethasone treatment for chemotherapy may cause a considerable rise in IOP potentially leading to significant visual loss from glaucoma. This possibility should be anticipated especially in children and in patients with pre existing glaucoma who are at higher risk of steroid responsiveness.

• T048

Müller cells increase survival of retinal ganglion cells - a coculture model of primary retinal ganglion cells and primary Müller cells

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Purpose Müller cells are considered to be vital in the maintenance of retinal ganglion cells (RGCs), and since RGCs are essential to maintain the neuronal function of the retina, a functioning symbiotic partnership between Müller cells and RGCs is fundamental. The present study evaluates glia-neuron interactions in a coculture model of primary Müller cells and primary RGCs.
Methods To investigate the Müller cell-RGC interaction we developed a coculture model, in which primary Müller cells from mice were grown in inserts on top of pure primary RGC cultures likewise from mice. The impact of 24 hours of starvation on the ability of Müller cells to protect RGCs was evaluated. Moreover, changes in glutamate uptake were studied in Müller cells as well as cell viability in response to starvation.
Results The presence of Müller cells significantly increased the survival of RGCs during normal conditions as well as during 24 hours of pre-starvation. Glutamate uptake capacity was significantly increased during starvation along with an increased Vmax. Starvation induced significantly reduced cell viability both in Müller cells and RGCs with a significantly greater reduction of cell viability in Müller cells.
Conclusions The present study reveals an increased survival of RGCs in presence of Müller cells and herewith we confirm Müller cells as being key players in RGC homeostasis. Moreover, we verify the coculture model as being a unique approach to study the glia-neuron partnership in inner retinal diseases.

• T049

Quantification of green fluorescent protein expression in mouse retinal ganglion cells following intravitreal injection of recombinant adeno-associated virus

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Purpose To determine the transduction efficiency and spatial pattern of green fluorescent protein (GFP) expression in mouse retinal ganglion cells (RGCs) following intravitreal injection of recombinant adeno-associated virus (rAAV2).
Methods 16 adult C57bL/6 mice received intravitreal injections of rAAV2-CAG-GFP at 3 different titres: 1 x 10E11, 1 x 10E12 or 1 x 10E13 genomic particles/ml. 2ul of the virus was injected at each concentration. To determine the effect of volume on transduction efficiency, a subset of animals received 1ul of the highest viral titre.

Animals were sacrificed 21 days after injection. Retinal wholemounts were immunostained with Brn3a to identify RGCs and quantification carried out using imageJ software. The percentage of GFP positive RGCs was measured at each titre using Volocity software at 20X magnification. A further 20-25 images at 10X magnification were captured for each titre and merged using to reconstruct the entire wholemount to assess the spatial pattern of expression.
Results RGC transduction rate increased with viral titre; 10% at 1 x 10E11, 53% and 1 x 10E12 and 64% at 1 x 10E13 genomic particles/ml. The volume injected did not appear to affect the transduction efficiency, with 64% of RGCs transduced at the highest titre using either 1 or 2 ul injection. GFP intensity also increased with viral titre with the spatial pattern of GFP expression more extensive at the highest titre. GFP expression at lower titres tended to localise around the injection site.
Conclusions GFP transduction efficiency of RGCs can be quantified efficiently using Volocity software. We have demonstrated an increase in GFP expression and spread at higher viral titres with similar transduction efficiency at a lower volume.

• T050

Age related changes in axon guidance cues in the optic chiasm

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Purpose Adult mammalian retinal ganglion cells (RGC) usually fail to regenerate axons post injury. Axon regeneration can be facilitated by several approaches but misguidance of regenerating axons at the optic chiasm is often observed and has been attributed to intrinsic proprieties of RGCs and/or a lack of extrinsic guidance cues in the adult visual system. This study characterizes the guidance cues present in the adult optic chiasm compared to the embryonic visual system.
Methods Known guidance cues were examined in embryonic and adult optic chiasms of C57 mice by IHC. Radial glial markers (RC2/BLBP/Slit1) and developmental markers (Shh/Pax2) were assessed. RC2, BLBP, Slit1 and Shh are known as inhibitory guidance cues while Pax2 is a permissive guidance cue.
Results Staining for glial markers RC2 & BLBP was detected immediately superior to the optic chiasm in coronal E15.5 samples. In coronal adult brain samples, RC2 & BLBP staining was observed in the optic chiasm midline; a very different distribution to E15.5 samples. No staining was observed in E15.5 or adult horizontal samples. Slit1 showed expression in the optic chiasm midline and optic tract at E15.5, but no staining was detected in the adult. Shh showed the same pattern as Slit 1 in the optic nerve at E15.5. Pax2 was present in optic nerves of both embryonic and adult samples.
Conclusions Here the profile of guidance cues in the embryonic and adult visual system was characterized. In the developing embryo all markers, known to be crucial for establishing axonal pathways along the optic stalk and optic tract, were present. In the adult visual system Slit1 and Shh were absent, RC2 and BLBP were ectopically expressed, and Pax2 expression was low. These results may explain misguidance of regenerating RGC axons in the adult optic chiasm, highlighting the importance of understanding this environment.

• T051

Increased intraocular pressure causes deficiency in the level of ELAVL1/HuR cytoplasmic fraction in the retina

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Purpose To evaluate impact of raised intraocular pressure on RNA binding protein *ELAVL1*/HuR expression in retina.
Methods In order to induce glaucomatous damage, intraocular pressure was increased unilaterally using modified rat bead model and maintained for up to 8 weeks. Fellow eye was used as a healthy control. Animals were sacrificed, retina and optic nerves were collected and processed for western blot (WB) analysis or for immunostainings.
Results Glaucomatous damage was confirmed in electron microscopy by the presence of axonal damage, myelin sheat dezintegration and glial cells proliferation within the optic nerve. Eight weeks glaucoma induced up to 36% loss of Retinal Ganglion Cells (RGCs) in the retina. In fractionated WB analysis of retinal homogenates, the level of active, cytoplasmic fraction of HuR was decreased approximately 3-times when compared with healthy tissue ($p<0.05$). Additionally, the cytoplasmic levels of cell cycle regulatory proteins (Hsp70, p53), whose expression is regulated by HuR, were also decreased. Stereological analysis of retinas revealed decrease in the number of double-stained RGCs (positive for β3tubulin+HuR) below the number of total β3tubulin positive RGCs (1960±885 cells/mm2 vs 2136±689 cells/mm2) what means that some of them lost visible HuR expression. Immunostaining of retinal and optic nerves cross sections showed decreased expression of HuR within RGCs and increased expression within optic nerve glia in glaucoma samples.
Conclusions Increased intraocular pressure results in defect of active fraction of RNA binding HuR protein within retina and specifically within RGCs. This defect is linked with decreased expression of HuR-dependent regulatory proteins (Hsp70, p53). This might be mechanism contributing to the development of glaucomatous degeneration.

• T052

The predegenerated nerves extract enhances the endogenous neuroprotective system of Retinal Ganglion Cells by modulating of BDNF expression in rat glaucoma model

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Purpose To verify impact of the administration of extract from predegenerated rat sciatic nerves on the expression and co-localization of endogenous BDNF and whether this change promotes survival of RGCs in rat glaucoma model.
Methods Experimental glaucoma was induced unilaterally (the right eye) based on modified bead model. The left eye served as control. Two, 7, or 14 days following glaucoma induction, nerve extract (PNE groups) or PBS was injected into the vitreous body. Time of exposure of RGCs to the extract was 2, 3, or 4 weeks. Five days before euthanasia, RGCs were labeled by FluoroGold (FG). Number of FG-positive RGCs was estimated and expression of BDNF was analyzed in immunohistochemistry.
Results BDNF was highly expressed in inner nuclear layer (INL) and RGC layer in the healthy eye and weakly in RGC layer in glaucoma. Injection of the extract at 14th day following induction of glaucoma and three-week-exposure to the extract resulted in the strongest increase in endogenous BDNF expression in both INL and ONL and weaker in RGC layer what was correlated with the highest RGCs survival (2943±147 in PNE group vs 2212±497 in PBS group; $p<0.05$). BDNF expression in RGC layer co-localized with RGCs markers and glial cells markers (both cells bodies and processes).
Conclusions The increase in the endogenous BDNF expression is correlated with survival of RGCs and is the highest when the extract is administered 14 days following glaucoma induction acting for 3 weeks.

• T053

Association of polymorphic variants of miRNA processing genes DGCR8 and XPO5 with primary open-angle glaucoma risk in a Polish population

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Purpose Many reports suggest the association between altered miRNA level and the pathogenesis of glaucoma. The single nucleotide polymorphisms in genes ***DGCR8*** and ***XPO5***, which are involved in microRNA biogenesis, may be the key factor in this process. The aim of this study was the analysis of the single nucleotide polymorphisms of ***DGCR8*** and ***XPO5*** genes, which are involved in miRNA processing pathway, in relations with primary open-angle glaucoma (POAG).
Methods The material used in the experiment was blood obtained from patients affected by primary open-angle glaucoma and age matched controls. The control groups rs3757 ***DGCR8*** and rs11077 ***XPO5*** consisted of 135 and 140 subjects respectively. The rs3757 ***DGCR8*** study group consisted of 137 patients, while rs11077 ***XPO5*** number of patients was 138.The polymorphic variant frequencies of rs3757 and rs1107 were determined using DNA isolated from the peripheral blood lymphocytes in TaqMan® SNP Genotyping Assays.
Results The statistical analysis revealed that the genotype AG of ***DGCR8*** rs3757 occurred more frequently in healthy individuals ($P = 0.001$), while homozygote GG was present mostly in people affected by primary open-angle glaucoma ($P = 0.003$). No association between the risk of POAG and AC/CC genotypes of ***XPO5*** was found.
Conclusions During the experiment it was evaluated that genotype AG in rs3757 ***DGCR8*** exhibits protective effect, decreasing the risk of primary open angle glaucoma, while the homozygote GG probably is associated with increased risk of glaucoma. The analysis of polymorphic variants of the genes involved in miRNA biogenesis could enable people classification to high-risk group.
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• T054

Neuroprotective effects of EPA and DHA fatty acids in the DBA/2J hereditary glaucoma mouse model

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Purpose To determine whether omega-3 (ω-3) supplementation used alone or in combination with timolol,protect against inflammation and RGC loss in DBA/2J mouse model
Methods DBA/2J mice were assigned to the following treatment groups (n=20/group) with balanced sex:ω-3 plus timolol,ω-3,timolol and untreated.All treatments were started at the age of 8.5 months and continued until sacrifice at 11.5 months of age.Mice received daily gavage administration of fish oil (EPA/DHA=2:1) and/or topical instillation of timolol (0.5%) once a day.The dosage of EPA/DHA was adjusted so that the AA/EPA blood ratio was within therapeutic range of 1-1.5 using Gas chromatography.RGC densities were counted using Brn3a antibody.Real-time polymerase chain reaction was performed to determine the gene expression of TNF-α,IL-1β and IL-18 inflammatory molecules in the retinas.Western blot analysis was used to test the protein expression of IL-18 in the retinas.
Results RGC densities were found significantly higher in the groups of ω-3 plus timolol (***p=0.0041***),ω-3 (***p=0.0097***) and timolol (***p=0.0011***) compared to that of untreated group.No significant differences were seen in the gene expression levels of TNF-α (*p*=0.0790,*p*=0.0742,*p*=0.1006),IL-1β (*p*=0.1242,*p*=0.4865,*p*=0.5280) and IL-18 (*p*=0.6320,*p*=0.3351,*p*=0.3663) in the retinas between the groups of ω-3 plus timolol,ω-3 or timolol and the untreated group.Protein expression of IL-18 was significantly reduced in the retinas of ω-3 treatment group compared to that of untreated (***p=0.0367***)
Conclusions Our findings suggest not only that ω-3 supplementation (AA/EPA ratio <1.5) has a neuro-protective effect in the DBA/2J, as demonstrated by the RGC density analysis, but also provide insight into the role of inflammation in the pathogenesis of glaucoma and indicate that ω-3 administration could be beneficial in controlling inflammation in the retina.

• T055

The vitreopapillary interface in healthy and glaucoma – The VPI study.

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Purpose During posterior vitreous detachment (PVD) the posterior hyaloid remains, for a certain period, attached to the posterior pole. At the macula, the vitreomacular interface and its associated disease has been studied extensively. The opposite is true for the vitreopapillary interface, especially in glaucoma patients. As glaucoma affects the shape and cupping of the optic nerve head, this study aims to investigate the possible influence of vitreous traction on the disc.
Methods The VPI study (NCT02290795) is a cross-sectional prospective study including healthy subjects and glaucoma patients. A subset of the glaucoma patients was followed-up longitudinally to assess the impact of filtering surgery on the VPI. All glaucoma patients underwent a comprehensive ophthalmological investigation, automated visual field test, confocal scanner and OCT scan. Healthy subjects filled in a questionnaire on gender, age, medical history, medication use and had also had an OCT-scan to determine PVD status.
Results In total, 258 healthy subjects and 349 glaucoma patients were included rendering data on 1214 eyes. Glaucoma patients were significantly older than their healthy counterparts (66.5 ±12.8 vs 60.1 ±14.8, p<0.001). Split up per PVD stage, the age did not differ in PVD stage 0, but for every following PVD stage, glaucoma patients were significantly older (54.2 ±11.7 vs 50.1 ±14.4 (p=0.071); 61.1 ±10.4 vs 54.7 ±14.0 (p<0.001); 72.5 ±8.9 vs 67.7 ±5.9 (p<0.001); 73.7 ±9.9 vs 71.4 ±9.3 (p=0.014) for PVD stage 0;1;3;4 respectively).
Conclusions The process of PVD formation lasts significantly longer in glaucoma patients.

• T056

Longitudinal changes in retinal nerve fiber layer thickness in a healthy caucasian population

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Purpose To study the loss of retinal nerve fiber layer thickness over time in healthy subjects.
Methods In this prospective longitudinal study 65 female and male subjects (age 62.7 ± 10.6 years) were included. In the present study an optic disc cube scan protocol was employed to measure RNFLT using the Cirrus HD-OCT. The OCT scans were repeated in intervals between 3 and 6 months, the number of OCT scans was between 3 and 11 and the average observation period was 30 months. Linear mixed models were used to fit OCT data.
Results On average a loss of RNFLT was seen during the average observation period. In a multiple regression model two factors influenced the results: age and baseline RNFLT. The greater the RNFLT value at baseline the stronger the loss of RNFLT. When dividing the subjects into 2 age groups a decrease in RNFLT was only seen in older subjects (70.2 ± 6.1 years), but not in younger subjects (55.1 ± 8.6 years). This decrease of average RNFLT in the older age group was -0.61 µm/year (95% confidence interval −1.10 µm/year to −0.11 µm/year).
Conclusions The present study indicates a loss of RNFLT thickness over time in healthy subjects. This decrease was seen in older subjects, but not in younger individuals. The age-dependent loss of RNFLT should be considered when progression is analyzed in patients with neurodegenerative diseases such as glaucoma, multiple sclerosis or Alzheimer's disease.

• T057

A vascular comparison between primary open-angle glaucoma and normal-tension glaucoma

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Purpose To contrast systemic and ocular vascular parameters in patients with normal-tension glaucoma (NTG) versus primary open-angle glaucoma (POAG).
Methods Sub-analysis of a prospective, cross-sectional, case–control hospital-based study investigating ocular blood flow in glaucoma patients (Leuven Eye Study). Systemic and ocular vascular parameters, including a questionnaire, blood pressure, dynamic contour tonometry, colour Doppler imaging, retinal oximetry and optical coherent tomography enhanced-depth imaging, were compared between an age-matched group of POAG and NTG patients.
Results We included 192 NTG and 214 POAG patients. Patients with NTG presented with significantly lower diastolic blood pressure (P=0.01), decreased acceleration in the central retinal artery (P=0.02), increased resistive index in the ophthalmic artery and central retinal vein (both P=0.04), thinner peripapillary choroidal thickness (P<0.001) and higher retinal venous oxygen saturation (P<0.001). The odds of suffering from hypotension, migraine and Raynaud were significantly higher for NTG patients (95% confidence interval (CI) 1.30-8.73, 1.13-4.42 and 1.36-3.95 respectively), as were the odds of taking systemic bèta-blockers, calcium antagonists and angiotensin II receptors blockers (95% CI 1.04-2.67, 1.21-6.62 and 1.18-5.97 respectively).
Conclusions Patients with NTG differ significantly on several ocular and systemic vascular parameters from POAG patients. These findings add further support to a higher weight for vascular-driven neuropathy in NTG vascular etiology in NTG.

• T058

Factors determining the prelaminar tissue thickness in glaucoma

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Purpose To identify demographic, anatomic and functional factors associated withthe prelaminar tissue thickness (PTT) and LC (thickness and depth) in primaryopen angle glaucoma (POAG).
Methods Cross-sectional study including 60 patients with POAG.The optic nerve head was imaged usingthe enhanced depth imaging (EDI) technology of Spectralis optical coherencetomography (OCT). The vertical distances from three equidistant points on thereference line (Bruch's membrane opening) to the anterior prelaminar tissuesurface and the anterior and posterior surfaces of the LC were manually measured.Analyzed factors associated with the PTT and LC thickness and depth includedage, central corneal thickness, axial length (AL), intraocular pressure (IOP),rim and disc areas (OCT-Cirrus), retinal nerve fiber layer (RNFL) averagethickness (OCT-Spectralis), ganglion cell layer and inner plexiform layer (GCIPL) average thickness (OCT-Cirrus) and meandeviation (MD) in visual field.
Results Significantassociations were found between the PTT and age (-0.317;P=0.014), disc and rim areas (-0.544; P=0.005 and 0.772; P<0.001respectively), BMO diameter (-0.332; P=0.01), RNFL and GCIPL average thickness(0.642; P<0.001 and 0.663;P<0.001, respectively) and MD(0.584;P<0.001). LC depth correlated with age (-0.267; P=0.041), rim area(-0.466; P=0.019) and cup depth (0.849; P<0.001). A negative association wasalso demonstrated between AL and LC thickness (-0.53; P=0.01). As expected, MDwas significantly correlated with cup depth.
Conclusions Theprelaminar tissue thickness was inversely correlated with age, anatomic (RNFL,CGIPL, disc and rim areas, BMO) and functional parameters (MD) in patients withPOAG, so that it can be considered together the LC a relevant structure in thepathophysiology of glaucoma.

• T059

Lamina cribrosa displacement after trabeculectomy in pseudoexfoliation and primary open angle glaucoma

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Purpose To compare the changes in lamina cribrosa depth between eyes with pseudoexfoliation glaucoma (PEXG) and primary open angle glaucoma (POAG) following trabeculectomy.
Methods The prospective study included 37 glaucomatous eyes (23 PEXG and 14 POAG). The lamina cribrosa depth was measured using enhanced depth imaging spectral domain optical coherence tomography before trabeculectomy and three months after the surgery. The postoperative displacement of the lamina cribrosa (LCD) was compared between the PEXG and POAG groups. The relationship between LCD and intraocular pressure (IOP) reduction was analysed.
Results There was a significant reduction in the mean (± SD) IOP in PEXG and POAG eyes following the trabeculectomy (14.2±7.2 mmHg, p<0.001, 14.4±7.5 mmHg, p<0.001; respectively). In total, the median (IQR) depth of the lamina cribrosa decreased from 469.4 (209.3) μm at baseline to 443.7 (145.5) μm three months after the surgery (p<0.001). No significant difference in median (IQR) postoperative lamina cribrosa displacement between the PEX and POAG patients was found (42.1 (50.8) μm and 22.8 (53.9) μm, respectively; p=0.186). The anterior displacement of lamina cribrosa after trabeculectomy did correlate significantly neither with the baseline IOP nor with the IOP reduction in the examined groups.
Conclusions In glaucomatous eyes the anterior displacement of the lamina cribrosa occurred after the IOP reduction following trabeculectomy. However, no differences in the decrease of the lamina cribrosa depth were found between the pseudoexfoliation glaucoma and primary open angle glaucoma patients. The association between the lamina cribrosa displacement and IOP reduction was not significant.

• T060

Anterior segment parameters measured by ultrasound biomicroscopy in the subtypes of angle-closure

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Purpose To compare anterior segment parameters in primary angle closure suspect (PACS), primary angle closure (PAC), and primary angle closure glaucoma (PACG) using ultrasound biomicroscopy (UBM P60, Paradigm Inc, Utah, USA).
Methods 59 eyes of 59 patients with PACS, 41 eyes of 41 patients with PAC, and 51 eyes of 51 patients with PACG were investigated. Definitions of PACS, PAC, and PACG were based on the recommendation from the International Society for Geographic and Epidemiological Ophthalmology. In each participant, slit lamp examination, funduscopy, gonioscopy, Goldmann applanation tonometry and UBM were performed. Anterior segment parameters such as anterior chamber depth (ACD), anterior chamber width (ACW), lens vault (LV), angle opening distance 500 (AOD500), trabecular meshwork-ciliary process distance (TCPD), iris thickness (IT) and iris zonular distance (IZD) were evaluated.
Results AOD500 were significantly different among the angle-closure subtypes in nasal, inferior, and temporal quadrants (PACS>PACG>PAC; p<0.05). TCPD were significantly different among the subtypes in all quadrants (PACG>PACS>PAC; p<0.05). ACD were significantly different among the subtypes (PACG>PACS>PAC; p<0.05). ACW, LV, IT and IZD were not significantly different among the subtypes (p>0.05).
Conclusions AOD500, TCPD, and ACD were the smallest in PAC, and ACW, LV, IT, and IZD were similar among the angle-closure subtypes. There may be a consequence in the development of angle-closure from mild to severe damages (from PACS to PAC to PACG) in terms of intraocular pressure, angle status, and optic nerve head status. However, our results suggested that such consequence may not exist in anterior segment morphology measured by UBM.

• T061

Comparison of the pattern of peripapillary retinal nerve fiber layer damage between open-angle glaucoma and anterior ischemic optic neuropathy

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Purpose To compare the pattern of peripapillary retinal nerve fiber layer (RNFL) damage in between primary open angle glaucoma (POAG) and nonarteritic anterior ischemic optic neuropathy (NAION).
Methods Thirty-two eyes of 32 patients with unilateral NAION and 60 eyes of 60 patients with POAG were consecutively enrolled in this study. The age, sex, and average RNFL thickness of the POAG were matched by those of the NAION. All of the patients underwent thorough eye examination including Cirrus HD optical coherence tomography (Carl Zeiss Meditec, Dublin, CA, USA). Peripapillary RNFL thickness in the 4 quadrants and 12 clock hours were compared in both groups.
Results RNFL thickness of the nasal 1 o'clock area in NAION was significantly thinner compared to POAG (64.0 ± 18.9 and 75.8 ± 22.4 μm, $p = 0.014$). RNFL thickness of temporal 7 o'clock area in POAG was significantly thinner compared to NAION (78.7 ± 32.1 and 100.9 ± 42.1 μm, $p = 0.006$).
Conclusions RNFL thickness of nasal quadrant and superonasal sector was thinner in NAION. RNFL thickness of the inferotemporal sector was thinner in POAG.

• T062
Clinical precision for follow-up of glaucoma with PIMD-2 Pi

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Purpose To estimate sources of variation in measurements of the waist of the retinal ganglion cell axons in the optic nerve head (ONH) over 2π, PIMD-2π, and the consequences for clinical follow-up.
Methods The ONH of each of 18 eyes from 18 glaucoma subjects was imaged 3 times with SD-OCT (Topcon 3D OCT 2000, Japan, protocol 3D-Disc cube) at 2 separate occasions within 3 months. PIMD-2π was segmented 3 times with a custom semi-automatic algorithm. The magnitude of the variation among occasions, volumes and segmentations was estimated with an analysis of variance. The consequences of the estimated sources of variation for clinical follow-up was finally modelled, assuming a PIMD-2π loss rate of 10 % of baseline and one segmentation of PIMD-2π. The significance level was set to 0.05.
Results The variance for volumes was estimated to be on the order of 0.3 of the variance for occasions. The variance for segmentation was negligible compared to the variance for volumes. A significant change of PIMD-2π from baseline can be detected in 1.5 to 2 years. Increasing the number of visits per year from 1 to 4 substantially improves the detectability of PIMD-2π change from baseline. More than 4 visits per year does not improve the detectability further. Increasing the number of volumes per visit does not improve detectability.
Conclusions Within-subject morphometric estimation of the waist of the retinal ganglion cell axons in the ONH as PIMD-2π has potential as a useful estimate for follow-up of glaucoma.

• T063
Choroid thickened after non-penetrating deep sclerectomy

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Purpose To evaluate changes in peripapillary and macular choroidal thickness (CT) as well in optic nerve head (ONH) including prelaminar tissue, lamina cribrosa and optic disc cupping following deep sclerectomy (DS) and to analyze the relationship between these parameters and intraocular pressure (IOP) change.
Methods Prospective observational study involving glaucomatous eyes undergoing DS. ONH was evaluated by Spectralis optical coherence tomography (OCT) and enhanced depth imaging (EDI) technology. CT was automatically measured with swept-source - OCT Triton at the macula (fovea, inner and outer ring) and at four peripapillary locations. All OCTs were performed before surgery and at 1 week postoperatively and changes in choroid and ONH postoperatively were calculated. Linear regression models were used to determine predictors of choroidal changes including age, IOP change, and axial length (AL).
Results Thirty-two eyes of 32 patients undergoing DS were included (mean age: 71.9 ± 9.4). There was a significant reversal of ONH cupping after DS (P = 0.001). The mean choroidal thicknesses significantly increased compared to preoperatively (P= 0.002 for average peripapilar, P= 0.000 for four locations around the optic disc and P=0.000 for all nine macular sectors). Mean pCT thickening was inversely correlated with the mean IOP change (rho -0.754, P= 0.000). Mean cupping reversal significantly correlated with both mean prelaminar tissue thickening and pCT thickening (rho: -0.832, P =0.000 and rho:-0.582, P=0.012 respectively).
Conclusions Besides the well-known ONH morphological changes following IOP reduction after DS, peripapillary and macular choroid significantly thickened early after DS. Larger studies with longer follow-up are necessary to establish if these changes remain stable over time.

• T064
Macular ganglion cell layer abnormalities in Spectral Domain(SD)- OCT outside glaucomatous neuropathy

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Purpose Macular ganglion cell layer (GCL) analysis in OCT spectralis is increasingly used in ophthalmology in the detection and monitoring of chronic glaucoma.
Methods An analysis of GCL in SD-OCT (Spectralis®) is reported in 7 patients with no chronic glaucoma: 3 patients with maculopathy and 4 patients with neurological pathology.
Maculopathies were as follows : atrophic age related macular degeneration, occluded central venous branch of the retina, epiretinal membrane surgery.
The neurological pathologies include : multiple sclerosis, stroke complicated hemianopsia lateral homonymous,macro- pituitary adenoma complicated bitemporal hemianopia and acute anterior ischemic optic neuropathy .
A thickness map in microns correlated to a color scale is confronted with the multimodal imagery and visual field.
Results All patients have localized or diffuse thinning GCL. Structural damage correlated to the functional damage in neurological pathologies.
Maculopathies are also involved in GCL damage and should not be confused with an original glaucomatous damage.
Conclusions GCL abnormalities are not specifics for chronic glaucoma, we can find them in maculopathies, central nervous system pathologies and optic neuropathies.

• T065

From perfect visual function to "legally" blind in one year: New mutations in progressive cone dystrophy

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Purpose We aim to report a case of a fifteen year-old patient with severe and rapid bilateral visual impairment due to **progressive cone dystrophy** and describe the associated mutations.
Methods This is a case report of a patient with a rare disease who underwent full ophthalmologic evaluations including optical coherence tomography (OCT) of the posterior pole, fundus autofluorescence (FAF) and electroretinography (ERG).
Results A 15-year-old girl was presented at our Department with progressive vision loss and poor colour vision complaints. The patient reported these complaints for a year, despite a full uneventful ophthalmic evaluation at that time. Best-corrected visual acuity was 6/60 for each eye and Ishihara 24-plates colour test was altered. Fundoscopic evaluation showed a maculopathy with spotty pigment changes in addition to temporal pallor of the optic disk. Posterior pole OCT showed a reduced outer nuclear layer and retinal pigment epithelium unspecific changes. FAF revealed a central dark area surrounded by a ring of increased autofluorescence. ERG was inconclusive due to poor collaboration, although it was hypothesised to have a slight cone dysfunction.
Moreover, genetic analyses of *ABCA4* and *CDHR1* genes were found to be positive for multiple mutations. **The c.6816+2T>A (p.Leu2035Pro) mutation was never described** and the c.6104T>C (p.Leu2035Pro) mutation was only present in one patient with Stargardt disease.
After a period of 2 years of follow-up visual function and retinal disease remained stable.
Conclusions Progressive cone dystrophy is a rare inherited ocular disorder characterized by the loss of cone cells. This case report emphasizes the need to reach a clear diagnosis when uncommon symptoms appear in an otherwise normal ophthalmic evaluation and also describe newer mutations in *ABCA4* gene enhancing our knowledge about this disease.

• T066

Patterned macular dystrophy as the first sign of maternally-inherited diabetes and deafness (MIDD)

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Purpose Maternally inherited diabetes and deafness (MIDD) is a mitochondrial disorder characterized by the mutation of the mitocondrial DNA (mtDNA) at the 3243 position.The prevalence accounts for 0.5-2.8% of all cases of diabetes. In more than 80% of cases it is associated with a good prognosis bilateral pattern macular dystrophy. We show the importance of ocular examination to diagnose MIDD.
Methods We present a case report of MIDD.
Results A 42 year-old man was referred for a nonspecific blurred vision in both eyes since two months ago. Diabetes mellitus type 1 and migraine had been diagnosed at the age of 20. The patient wore a hearing aid because he had bilateral sensorineural hearing loss.Best-corrected visual acuity (BCVA)was 20/20 in both eyes. Fundus examination revealed bilateral hyperpigmented lesions surrounding the macula combined with depigmented areas of retinal pigment epithelium (RPE). Spectral-domain optical coherence tomography (SD-OCT) showed hyperreflective dome-shaped lesions corresponding to a hyperpigmented areas that seemed to originate from the RPE. Fundus autofluorescence (FAF) was characterized by a diffuse speckled appearance of the macula with decreased FAF signal in areas of RPE atrophy and irregular increased FAF signal between the areas of RPE atrophy. Results from automated static perimetry and magnetic resonance imaging (MRI) of the brain was unremarkable. We suspected MIDD and genetic testing of mtDNA confirmed a point mutation at the locus 3243 with 85% heteroplasmy.
Conclusions Ophthalmologists need to be aware in patients presenting patterned dystrophies of the RPE in the context of diabetes or deafness. It is possible that there are other family members with undiagnosed disorders related to mitochondrial mutation who would benefit from ophthalmic evaluation, auditory testing and screening for diabetes mellitus.

• T067

Stargardt disease phenotype-genotype correlation – first results of a Lithuanian cohort study

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Purpose To describe the first phenotype-genotype correlation results of the patients with Stargardt disease in Lithuanian population**.**
Methods From may 2015 till april 2016 a prospective study was performed, 16 patients with Stargardt disease were involved. Ophthalmological examination included best-corrected visual acuity (BCVA), ophthalmoscopy, fundus photography, fundus autofluorescence (FAF), spectral-domain optical coherence tomography (SD-OCT) and specular microscopy. Different DNA variants in several genes have been identified for all patients.
Results The age of patients ranged from 18 to 66 years. Initial ophthalmoscopy revealed either no abnormalities or foveal retinal pigment epithelium (RPE) changes, foveal atrophy, atrophic RPE lesions, and/or irregular yellow-white fundus flecks. Different FAF patterns were observed: central atrophy surrounded by ring of increased AF, irregular hypo/hyper AF or spots of hypo AF in the posterior pole. SD-OCT revealed photoreceptor damage followed by atrophy of the outer retina, RPE, and choroid. The mean central retinal thickness of the right eye was 96,5±57,004 µm and 110,9245±54,84872 of the left eye. The mean subfoveal choroidal thickness, the endothelial cell count and corneal thickness were also evaluated.
Conclusions These are the first results of Stargadt disease in Lithuanian population. All patients had a different phenotypic expression. Further investigations conserning individual mutations contribution to phenotype are necessary.

• T068

A Novel Homozygous c.1154+3_1151+6delAAGT mutation in CERKL Causes Autosomal Recessive Retinitis Pigmentosa with a Special Phenotype in a Consanguineous Tunisian Family

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Purpose The aim of our study was to assess the clinical phenotype and to determine the causative gene in a Tunisian family with an autosomic recessive retinitis pigmentose (arRP).
Methods All accessible members of a consanguineous Tunisian family were included and underwent full ophthalmic examination with best corrected Snellen visual acuity, fundus photography, optical coherence tomography (SD-OCT) and full field electroretinography (ERG). Index patient was selected for whole exome sequencing (WES) followed by homozygosity mapping. All detected variations were confirmed by direct Sanger sequencing.
Results The clinical data of the patients showed typical hallmarks of RP symptoms for which affected individuals initially experienced night blindness with progressive visual loss and hemeralopia since the first decade of life. Visual acuity at baseline ranged from 1/10 to 5/10. Funduscopy revealed essentially mild optic disc and retinal atrophy and virtually no clumped pigmentation. Macula was normal in young patients and showed atrophic alteration in advanced stages. ERG was unrecordable in scotopic conditions and the cone responses were markedly hypovolted. Homozygosity mapping and whole exome sequencing identified a 4-pb deletion, c.1154+3_1151+6delAAGT, located in the donor splice site of intron 8 of *CERKL*. The mutation impacts pre-mRNA splicing of *CERKL*. This new deletion was present at a homozygous state in the two affected sons and was heterozygous in the parents. It was not present in the unaffected sister.
Conclusions Mutations in *CERKL* gene have been reported in patients with retinitis pigmentosa, c.1154+3_1151+6delAAGT is a novel splicing variant associated with arRP. Extending the mutation spectrum of *CERKL* with additional families is important for genotype-phenotype correlations.

• T069

Oguchi disease due to a novel mutation in the GRK1 gene

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Purpose To present the phenotype and genotype of a patient with Oguchi disease, a rare autosomal recessive form of congenital stationary night blindness.
Methods A 20-year old lady of Indian ethnicity presented with a history of congenital nyctalopia. She underwent an extensive ophthalmological and genetic work-up.
Results BCVA was 6/6 in both eyes. Slit-lamp examination was unremarkable. Fundoscopy revealed a bilateral, widespread golden-yellow discoloration and peripheral patches of normal, darker pigmentation. Blue-light fundus autofluorescence imaging and visual field testing were normal. Spectral domain OCT showed a normal anatomic retinal structure, however with hyperreflectivity and blending of the ISe, COST and RPE layers. Absent rod responses in the dark-adapted state, electronegative maximal combined responses and subnormal light-adapted responses were detected on full-field ERG. After prolonged dark-adaptation, the fundus appearance was normal (Mizuo-Nakamura phenomenon) with partial recovery of the rod-specific ERG responses. DNA analysis confirmed the clinical diagnosis of Oguchi disease and revealed homozygosity for a novel deletion in the GRK1 gene (c.1549_1559del - p.Pro517Glyfs*).
Conclusions A patient with Oguchi disease due to homozygosity for a novel mutation in the GRK1 gene is described, increasing the total number of causative mutations and confirming the role of GRK1 in the pathogenesis of this very rare disorder.

• T070

Pseudodominance in a Czech family with Usher syndrome type II

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Purpose Usher syndrome is an autosomal recessive genetically heterogeneous disorder with congenital sensorineural hearing impairment and retinitis pigmentosa developing in late childhood and adolescense. We have identified a Czech family not aware of consanguinity with four members in two subsequent generations clinically diagnosed with Usher syndrome type II. The major aim of our study was to determine the disease-causing mutation(s) in this family.
Methods As an initial approach Sanger sequencing of *USH2A* exons 6, 7, 11, 13, 20, 61 was performed in the proband, followed by next-generation sequencing of a panel testing 286 genes known to cause various inherited ocular disorders. Available relatives were screened by Sanger sequencing for the detected mutations. 1161 population specific controls were used to check for allele frequencies of the identified sequence variants.
Results The proband was found to harbour compound heterozygous mutations c.11864G>A; p.(Trp3955*) and c.13342_13347del; p.(Asp4448_Ser4449del) in *USH2A* while her affected daughter and son were homozygous for the c.11864G>A mutation. Segregation analysis confirmed that father of the affected children was a heterozygous carrier of the *USH2A* c.11864G>A. Affected brother of the proband was not available for our investigation. Mutation c.11864G>A has been previously observed in patients with Usher syndrome type II. Geographical origin in a particular region in Moravia was noted for parents of both the affected proband and her spouse. None of the two mutations were detected in Czech controls.
Conclusions Pseudodominance may occur in outbred families. The estimation of the chance that a person will be a heterozygote carrier of a recessive disorder needs to be implemented into counselling. Geographic distribution of pathogenic alleles may display regional differences.

• T071

OPA1 analysis in an international series of probands with bilateral optic atrophy

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Purpose To determine the molecular genetic cause in previously unreported probands with optic atrophy from the United Kingdom, Czech Republic and Canada.
Methods *OPA1* coding regions and flanking intronic sequences were screened by direct sequencing in 44 probands referred with a diagnosis of bilateral optic atrophy. Detected rare variants were assessed for pathogenicity by in silico analysis. Segregation of the identified variants was performed in available first degree relatives.
Results A total of 29 heterozygous mutations evaluated as pathogenic were identified in 42 probands, of these 7 were novel. In two probands only variants of unknown significance were found. 76% of pathogenic mutations observed in 30 (71%) out of 42 probands were evaluated to lead to unstable transcripts resulting in haploinsufficiency. Three probands with the following disease-causing mutations c.1230+1G>A,c.1367G>A and c.2965dup were documented to suffer from hearing loss and/or neurological impairment.
Conclusions *OPA1* gene screening in patients with bilateral optic atrophy is an important part of clinical evaluation as it may establish correct clinical diagnosis. Our study expands the spectrum of *OPA1* mutations causing dominant optic atrophy and supports the fact that haploinsufficiency is the most common disease mechanism.

• T072

Two novel KERA mutations causing cornea plana in a Czech family and associated phenotypes

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Purpose To identify the molecular genetic cause in a previously not reported Czech family with the occurrence of cornea plana in two siblings.
Methods Detailed ophthalmological examination and direct sequencing of the KERA coding region in the proband followed by target analysis of the identified mutations in other family members.
Results The family was not aware of any consanguinity. Compound heterozygosity for a novel missense mutation c.209C>T; p.(Pro70Leu) and a novel splice site mutation c.887-1G>A in KERA were detected in both affected individuals. The mother was a heterozygous carrier of c.887-1G>A and the father of c.209C>T. In silico analysis supported the pathogenicity of both mutations. The younger brother, aged 13 years, had typical ocular phenotype of cornea plana with keratometry readings bellow 30 D, shallow anterior chamber, indistinct limbus and central corneal opacity. Corneal endothelial cell morphology was normal in the right eye; in the left eye specular microscopy images could not be taken. In the older brother, aged 20 years, marked thinning with protrusion in the superior part of the left cornea was present resulting into mean keratometry of 47.2 D. No corneal endothelial cell pathology was observed by specular microscopy bilaterally.
Conclusions The identification of two novel heterozygous mutations in the second Czech family with cornea plana does not support the hypothesis of a founder effect. Marked corneal thinning and protrusion in cornea plana is a very rare finding and longitudinal follow-up evaluation needs to be performed to determine its possible progressivity.

• T073

Metallothionein polymorphisms in a Northern Spanish population with Age-Related Macular Degeneration (AMD)

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Purpose To elucidate the potential role of single nucleotide polymorphisms (SNPs) in the metallothionein (MT) genes in Northern Spanish patients with aged-related macular degeneration (AMD).
Methods A case-control study of 130 unrelated Northern Spanish natives diagnosed with AMD (46 dry, 35 neovascular, and 49 mixed) and 96 healthy controls matched by age and ethnicity were enrolled. DNA was isolated from peripheral blood and genotyped for fourteen MT SNPs (MT1A: rs11076161, rs 11640851, rs8052394 and rs7196890; MT1B: rs8052334, rs964372 and rs7191779; MT1M: rs2270836 and rs9936741; MT2A: rs28366003, rs1610216, rs10636 and rs1580833; MT3: rs45570941) using TaqMan probes. The association study was performed using the HaploView 4.0 software.
Results The allelic frequency analysis revealed that rs28366003 in MT2A gene, showed the unique significant association with AMD (dry form; p=4.40x10-4), increased disease susceptibility ranged from approximately 9.80 for the allele G (OR= 9.80, 95% CI: 1.11-86.25). The frequency of genotype AA at SNP rs28366003 was significantly lower in dry AMD cases than in control under a recessive association model (p=2.65x10-4; AA vs AG+GG) conferring protection from the disease (OR=0.82, 95% CI: 0.71-0.95). No statistically significant differences were observed between AMD subjects and controls in the rest of the thirteen SNPs analyzed.
Conclusions The present study is the first to investigate the potential association of SNPs at MT genes with susceptibility to AMD. We found a significant association of SNP rs28366003 in the MT2A gene with susceptibility to the dry form of AMD in the Northern Spanish population

• T074

Classification and heritability of macular pigment spatial profile phenotypes using two-wavelength fundus autofluorescence

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Purpose We investigated the frequency and heritability of macular pigment (MP) spatial profile phenotypes determined by objective and subjective profile classification based on fundus autofluorescence (FAF).
Methods Between scans Coefficient of Repeatability (CoR) of MP optical density (MPOD) was calculated from two FAF scans (Spectralis, Heidelberg, Germany) of 40 participants (39±8.6 years) acquired in a single session. We then analyzed two FAF scans acquired in a single session from 314 twins (157 pairs; 39±8.8 years) and classified each MP profile as exponential, ring-like or central dip by subjective visual assessment. Profiles were also classified objectively based on deviations larger than the CoR away from the exponential fit. We calculated kappa agreement of the profiling methods, case-wise concordance of non-exponential profiles for the 88 mono- (MZ) and 69 dizygotic (DZ) twin pairs, and profile heritability.
Results Following visual subjective profiling, 64% showed an exponential profile, 27% presented ring-like and 9% central dip profiles; case-wise concordance was 0.80 for MZ and 0.41 for DZ twins. Following objective classification, 71% showed an exponential profile, 29% ring-like profile and no central dip profiles were identified; case-wise concordance was 0.74 for MZ and 0.36 for DZ twins. Heritability was calculated as 81.5% (95% CI 61.1 to 93.1). Between scan repeatability of profile classification showed good agreement objectively (κ=0.85, 95% CI 0.69 to 1.00; P<0.0005) and moderate agreement visually (κ=0.48, 95% CI 0.23 to 0.73; P<0.0005). Agreement of subjective versus objective profiling was low (κ=0.23, 95% CI 0.04 to 0.42; P=0.02).
Conclusions MP profiles showed high heritability. Compared to visual assessment, objective profile classification is a more reliable method for future experimental studies using two-wavelength FAF.

• T075

The zinc-metallothionein redox system in human retina and RPE

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Purpose The retina contains the highest concentration of zinc in the human eye and it is primarily associated with the photoreceptors and the RPE. Metallothioneins (MTs) are the main cytosolic zinc-ion-binding proteins, and their main roles include neuroprotection and maintenance of cellular zinc homeostasis. Zinc is the main regulator of MTs, and there is a tight control in the number of atoms of zinc bound to the MT proteins (stoichiometry), which could be related with their antioxidant and neuroprotective functions. The main purpose of this work is to study the Zn-MT system in the RPE and retina of the human eye.
Methods We first determined the total content of Zn by elemental mass spectrometry (i.e., ICP-MS), in RPE and retina from ***post mortem*** human donors, and compared its quantitative distribution by bio-imaging (i.e, laser ablation-ICP-MS), on cryogenic eye sections. Secondly, we carried out the quantitative speciation of zinc in the water-soluble protein fractions of RPE and neural retina, to study its protein binding profile. Finally we studied the effects of metals (i.e., ZnSO4), inflammatory cytokines (i.e., IL1a) and glucocorticoids (i.e., dexamethasone), by ICP-MS, in an ***in vitro*** cellular model of human RPE cells (HRPEsv).
Results We found preferential quantitative distribution of zinc in the RPE, followed by the retina in lesser levels. Zinc is mainly associated to high and low molecular mass proteins in both RPE and retina. Exogenous zinc, interleukin and dexamethasone increased MT proteins synthesis and induced a stoichiometric change in MT proteins in HRPEsv cells.
Conclusions The stoichiometric transition on Zn-MT proteins in HRPEsv and its potential implication against oxidative stress processes will be discussed.

• T076

Retinal function and morphology in Mitf mutant mice

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Purpose The Mitf (microphthalmia-associated transcription factor) gene that is essential for the normal development of the retinal pigment epithelium (RPE). Mutations in this gene can cause hypopigmentation, microphthalmia and blindness. The purpose of this work was to analyze the retinal function and morphology in mice with specific Mitf mutations.
Methods The following Mitf mutations were used: Mitfmi-enu122 (398), Mitfmi-wh/+, Mitfmi-wh/Mitfmi and wild type (C5BL/6J) mice as a control. Mice were anesthetized by an intraperitoneal injection of 40 mg/kg-1 Ketamine and 4 mg/kg-1 Xylazine. Flash electroretinography (ERG), from mice with pupils dilated, with a corneal electrode and a reference electrode placed in the mouth, was used to determine the role of the MITF protein in retinal function. Histological retinal sections were stained with hematoxylin and eosin.
Results ERG recordings revealed that only one of the four mutants had any retinal function. The wild type mice had significantly higher mean amplitudes of the photopic a-waves and scotopic oscillatory potentials than the Mitfmi-enu122 (398) animals (α= 0,05). Furthermore, Mitfmi-enu122 (398) had significantly shorter implicit times for the photopic b-waves and c-waves. Histology revealed that the RPE layer in the Mitfmi-enu122 (398) and shows localized thinning of the RPE and their retinas look normal. However, the Mitfmi-wh/+ showed a profound RPE degeneration and this layer is missing from the Mitfmi-wh/Mitfmi animals. Furthermore, Mitfmi-wh/+ and Mitfmi-wh/Mitfmi have an immense retinal degeneration, lacking the photoreceptor and outer plexiform layers.
Conclusions This study demonstrates that the Mitf gene has an impact on retinal function in mice, and the morphology of the neuroretina and the RPE.

• T077

The role of LRG1 in vessel normalization

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Purpose In diseases characterized by abnormal neovascularization, the new vessels lack adequate pericyte (PC) coverage. TGFβ is involved in the recruitment of PC through ALK1-Smad1/5/8 and ALK5-Smad2/3 signalling. The first signalling pathway inhibits differentiation into mural cells while the latter promotes it. Leucine-rich α-2-glycoprotein 1 (LRG1) is a modulator of TGFβ signalling. By binding to endoglin, LRG1 promotes the ALK1-Smad1/5/8 signalling pathway. We hypothesized that LRG1 may have an important role in PC recruitment
Methods Retinae from Lrg1-/- and WT mice were trypsin-digested and the endothelial cell (EC)/PC was calculated. The oxygen-induced retinopathy mouse model was used to assess PC coverage in the neovascular tufts and the leading edge of the revascularization in Lrg1-/- and WT mice. The retinae were stained for the PC markers NG2 and αSMA and the EC marker CD31. NG2/CD31 and αSMA/CD31 ratios were quantified in the above areas. Moreover, metatarsals from mice fetuses were treated with PBS, LRG1 and angiogenic factors either alone or in combination. Then they were stained for NG2 and CD31 and the fraction of CD31 overlapping with NG2 was quantified
Results Quantification of EC/PC ratio revealed no difference between the control genotypes. In the neovascular tufts, Lrg1 deletion leads to a higher ratio of NG2+ PC whilst at the leading edge of the revascularization of the avascular region, PC coverage was not affected. In the metatarsals the combination of VEGF+LRG1 leads to significantly lower PC coverage compared to the control
Conclusions We demonstrate that under physiological conditions, deficiency of Lrg1 does not alter perivascular coverage. However, during abnormal neovascularization, Lrg1 deficiency seems to lead to increased PC recruitment while exogenous supplementation of LRG1 especially in combination with VEGF decreases it

• T078

Validation of the STARS risk assessment tool for age-related macular degeneration in an Algerian population

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Purpose A risk assessment tool for age-related macular degeneration (AMD) has been previously developed and validated in two European countries (Italy, France). The objective of the present study was to validate its use in an Algerian population.
Methods The STARS (Simplified Théa AMD Risk-assessment Scale) questionnaire is a simple 13-item, self-administered questionnaire, including questions on socio-demographic characteristics, family history of AMD, systemic and ocular risk factors. We included 1183 patients over 55 years of age from 23 Algerian ophthalmologists. Patients completed the questionnaire, and ophthalmologists performed a fundus examination for AMD diagnosis (early AMD if soft drusen and/or pigmentary abnormalities; late AMD if atrophic and/or neovascular AMD). The validity of the final score was determined using ROC curves and Hosmer and Lemeshow testing. Patients were classified as low (score 0 to 9), moderate (10 to 19) or high risk (scores of 20+).
Results Complete data was obtained for 942 (79.6 %) patients, among whom 53 (5.6 %) had late AMD and 288 (24.1 %) had early AMD. The area under the ROC curve was 0.80, indicating good discrimination. The Hosmer and Lemeshow test was not statistically significant (p=0.60), showing a good adaptation of the model to the data. Only 26 of the 662 (3.9 %) patients without AMD were categorized as high risk and only 8 of the 53 patients (15 %) with late AMD were categorized as low risk.
Conclusions This study confirmed the validity of this short risk assessment tool, which shows good discrimination and high feasibility also in a North-African country. Early diagnosis of AMD is key to improve disease outcomes in patients. STARS is a promising questionnaire that allows early, simple and fast identification of patients at risk of AMD.

Conflict of interest
Any consultancy arrangements or agreements?:
Allergan, Bausch+Lomb, Laboratoires Théa, Novartis, Roche
Any research or educational support conditional or unconditional provided to you or your department in the past or present?:
Laboratoires Théa, Essilor
Any financial support like travel accomodation hospitality etc provided to you or a member of your staff or an accompanying person?:
Laboratoires Théa

• T079

Variations in normative foveal morphology SD-OCT data: A study of White, South Asian and Black ethnicities

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Purpose Foveal morphology shows significant inter-individual variation and ethnicity may play a role. We investigated variations in specific retinal layer thickness and foveal pit shape in three ethnic groups.
Methods We recruited 226 healthy volunteers age 18 to 39 years (76 white, 80 South Asian and 70 black; male to female ratio 1:2 per ethnic group). Foveal thickness including inner retinal layer (IRL), outer nuclear layer (ONL), photoreceptor layer (PRL), retinal pigment epithelium (RPE), foveal width and foveal pit depth (FPD) were taken from Spectralis (Heidelberg, Germany) SD-OCT scans. Retinal layer thickness measurements were taken from 0° to 3.8° eccentricity from the fovea. Two-way ANCOVA evaluated the impact of ethnicity and gender confounders on foveal morphology parameters, while controlling for refractive error.
Results White subjects had thicker central IRL (130±21μm) than South Asian (123±16μm) and blacks (116±14μm; $F(2)=12.4$, $p<0.0005$). This was also true for ONL ($p<0.0005$) and PRL ($p=0.03$), but not for RPE ($p=0.31$). We report similar findings for thickness comparisons up to 3.8° retinal eccentricity. Foveal width was narrower in whites (2226±261μm) compared to South Asian (2417±273μm) and blacks (2300±223μm; $F(2)=10.0$, $p<0.0005$). Ethnicity explained around 12% of the variance in IRL and foveal width, while gender played no significant role ($p>0.05$). The depth of the foveal pit was significantly shallower in white (120±25μm) and South Asian (121±18μm) than blacks (129±17μm, $F(2)=4.8$, $p<0.009$), with no significant effect of gender ($p=0.39$).
Conclusions The overall foveal pit profile significantly varies with ethnicity. Our results indicate that ethnicity explains more of the variation in foveal morphology than gender, and should be taken into account when interpreting OCT scans.

• T080

Diabetic retinopathy and hearing loss; Results from Korean National Health and Nutrition Survey (KHANES V) (2010-2012)

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Purpose Microvascular vascular diseases have known as risk factors of hearing loss. There may be a relationship between diabetic retinopathy (DR) and hearing loss based on their vascular etiology. We investigated the association between hearing loss and severity of diabetic retinopathy.
Methods For this cross-sectional, population based study, we used data from Korean National Health and Nutrition Survey (2010-2012). We enrolled adults aged 40 years or more with diabetes. The subjects with conductive hearing loss or missing exam data were excluded. Demographic, socioeconomic, general medical data were used for this analysis. We defined hearing loss using puretone average air-conducted hearing thresholds. DR was divided into no DR,non-proliferative DR and proliferative DR. Participants were divided into two groups (middle age (≤ 60) vs. old age groups (> 60)). Association between hearing loss and DR was determined using logistic regression analyses.
Results 1045 subjects (n=411 in middle age group, n=634 in old age group) were finally enrolled. Overall, a proportion of hearing loss is 57.2% in no DR, 61.4 % in NPDR and 85.0% in PDR. Logistic regression model after adjusting age, sex and other confounding factors showed only age (OR, 1.13, 95% CI 1.01-1.16) and sex (male) (OR 2.99, 95% CI 1.49-6.00) were associated with hearing loss. However, in middle age group, age (OR 1.09, 95% CI 1.04-1.15), sex (male) (OR 4.88, 95% CI 2.01-11.90), the presence of PDR (OR 9.63, 95% CI 2.17-42.59) and noise exposure (OR 1.88, 95% CI 1.03-3.29) were associated with hearing loss, while only age (OR 1.21, 95% CI 1.15-1.26) was significant in old age group.
Conclusions Our study supports a potential role for microvascular diseases in the development of hearing loss especially in middle aged patients. Retinopathy could be window of various other vascular pathologies.

• T081

The German AugUR study: a population-based prospective study to investigate chronic diseases in the elderly with focus on age-related macular degeneration (AMD)

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Purpose Population-based epidemiological data on eye diseases are important determinants to steer health care. However, these data on prevalence, incidence, and risk factors are scarce in Central Europe and particularly in Germany. We therefore sought to establish such data for Bavaria, here focusing on age-related macular degeneration (AMD).
Methods The AugUR study (Age-related diseases: understanding genetic and non-genetic influences - a study at the University of Regensburg) is a population-based prospective study in the mobile general population of Caucasian ethnicity aged 70 years and older in and around Regensburg, Bavaria. The study protocol includes ophthalmological anamnesis and examinations with testing of central retinal function (visual acuity, photostress test, Amsler Grid) as well as retinal imaging (standardized color fundus photographs of the central retina, confocal laser scanning ophthalmoscopy and spectral domain optical coherence tomography). The presence and extend of AMD is categorized via color fundus photographs into early and late stages.
Results Since 2013, AugUR has recruited 1,133 participants, with 1,041 (92%) having gradable fundus images for at least one eye. A total of 418 (37% of the 1,041) individuals showed drusen and pigmentary abnormalities corresponding to early AMD findings, 69 (6%) participants demonstrated late-stage AMD with neovascular or atrophic lesions. Importantly, we detected 83 (8%) persons with "latent" AMD, i.e. being anamnestically unknown to the participant; 29 (3%) of those individuals revealed late AMD stages.
Conclusions AugUR provides the first AMD prevalence estimates in an elderly German population. With an ongoing 3-year-follow-up, this data will help to better understand disease development and progression.

• T082

Spectrum and outcomes of open globe injuries presenting to a tertiary Eye Centre in Singapore

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Purpose To study the demographics and clinical outcomes of consecutive open globe injuries presenting to a tertiary centre in Singapore.
Methods Data was prospectively collected for all open globe injuries presenting to a tertiary ophthalmology unit in Singapore between January 2014 and December 2015. Main clinical outcomes were the interval to surgical intervention and visual outcome at 6 months.
Results We collected 11 cases with a mean duration of follow-up of 6.5 ± 3.9 months. The mean age was 42.9 ± 22.3 years and 81.8% were male. 10 cases (90.9%) were from industrial accidents and the remaining 1 (9.1%) was due to a fall. Eye protection was worn in only 27.3% (n=3) of cases. Indications for surgery included penetrating injuries (n=7), intraocular foreign bodies (IOFB) (n=3) and globe rupture (n=1). Nearly all cases (n=10) sought medical attention within 7.4 ± 5.7 hours of the injury, and the mean interval to surgical intervention in these cases was 4.1 ± 2.6 hours. The remaining 1 case presented 1 week after the injury, and underwent surgery 5 days after presentation, for a metallic IOFB impacted in the sclera. No cases developed endophthalmitis. The mean number of surgeries required was 1.6 ± 0.7. At presentation, the mean visual acuity (VA) in the affected eye was 2.0 ± 1.1 logMAR and the mean ocular trauma score was 68.7 ± 17.5. There were 8 cases (72.7%) remaining to follow-up at month 6, with a mean VA of 0.98 ± 1.12 logMAR, and 7 of 8 cases (87.5%) showed improvement in VA compared to presentation.
Conclusions In our study, open globe injuries in Singapore are quite uncommon, occurred predominantly in males, often secondary to industrial accidents, and use of eye protection was often inadequate. In a tertiary ophthalmology practice, the majority received prompt surgical repair and had improvement in visual acuity at 6 months follow-up.

• T083

Wooden projectile caused eye injuries in Finland - Helsinki eye trauma study

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Purpose To report the current population-based epidemiology, treatment, use of resources and outcomes of eye injuries caused by sticks, branches and other wooden projectiles in Finland.
Methods The study included all new patients injured by sticks, branches and other wooden projectiles with ocular or orbital traumas taken into care to the Helsinki University Eye Hospital (population base 1.5 million people) in one year. The follow-up period was three months.
Results Sixty-seven patients with male dominance (76%) were treated because of eye injury from wooden projectiles, compromising 6% of all new eye traumas treated in a one year period. Injury was most likely in spring (36%) and autumn (27%) and at the age of 51-57 years. The most common activity during the accident was playing (27%), forestry (16%) and gardening (15%) and most common diagnose after mild superficial trauma (n=36, 54%) was contusion (n=25, 37%), followed by eye lid wound (3), orbital fracture (2) and open globe trauma (1). Seven patients (10%) were estimated to have permanent disability because of lowered visual acuity (3), double vision (2), evisceration (1) and glare due to mydriasis (1), all being adults. Traumas were contusions and one orbital fracture and one open globe trauma caused in variable activities. Twenty five patients (37%) were estimated to need lifelong follow-up, most (24) because of contusion and one because of open globe trauma. Five of these patients were children age 3 to 11 years. Most took place during playing (7) or forestry (4). Eleven patients needed major surgeries. The number of outpatient visits was 167 and inpatient days 30.
Conclusions Wooden projectiles cause serious eye injuries, permanent disability and need for lifelong follow-up. More precaution should attend for eye protection when playing with sticks and during forestry and gardening.

Conflict of interest
Any research or educational support conditional or unconditional provided to you or your department in the past or present?:
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• T084

The prevalence of refractive errors among underserved rural areas in Iran

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Purpose To determine the prevalence of myopia and hyperopia and related factors in underserved rural areas in Iran.
Methods In this cross-sectional study, two rural regions of north and south in Iran were randomly selected through a multi-stage cluster sampling. After selecting samples, participants had non-cycloplegic refraction, cycloplegic refraction (<20 years old age) and measurement of uncorrected and corrected visual acuity.
Results Of the 3851 invitees participated, 3271 of them were examined in this study. The prevalence of myopia and hyperopia was 23% (95%CI: 19.6 -26.4) and 21.59% (95% CI: 17.92 -25.26), respectively in total sample. In those subjects ≤20 years of age, the prevalence of myopia and hyperopia based on cycloplegic refraction was 5.69% (95% CI: 4.42-6.96) and 3.25% (95% CI: 1.49-5.02), respectively. In over 20-year-olds subjects, these values were 29.47% (95% CI: 26.26-32.68) and 28.44% (95% CI: 24.40-32.49), respectively. Multiple logistic regression models indicted that myopia prevalence significantly correlated with age, education level, cataracts, and region of residence, and hyperopia prevalence correlated with age and region of residence.
Conclusions The results of this study indicated that the prevalence of hyperopia and myopia were lower compared to the other studies in urban areas of Iran, but overall, hyperopia had a high prevalence in this study and other Iranian investigations. The prevalence of refractive errors significantly differs between northern and southern rural regions of Iran.

• T085

Hyperhomocysteinemia caused chorioretinal vasculopathy in an animal model

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Purpose Many reports have suggested that hyperhomocysteinemia is a risk factor for atherosclerosis. Some of the reports further indicated that hyperhomocysteinemia was associated with neural degenerative diseases and even age-related macular degeneration (AMD). However, the pathogenesis of AMD has not been elucidated clearly yet. We therefore established an animal model to mimic hyperhomocysteinemia status in vivo. Morphological changes of chorioretina, and possibly involved growth factors were investigated in this study.
Methods The hyperhomocysteinemia animal model was generated by administering various doses of homocysteine via intravenous injection to Sprague-Dawley rats. Chorioretinal images from the rat models in the different treatment groups were recorded, and fluoresceine angiographies (FAG) were done. Histological examinations of the retina and choroid were also performed. Immunofluorescent studies were used to investigate the expression levels of vascular cell markers and different types of vascular endothelial growth factors (VEGF).
Results Significantly prominent choroidal vasculatures with congestion and retinal vascular disorders were observed in the chorioretinal images and FAGs of the hyperhomocysteinemic animals. The choroidal capillary plexuses were disclosed expanded and vascular endothelial cells proliferated in the histological examinations. We also found the expressions of VEGF and placental growth factor (PlGF) were both upregulated in the eyes of the animals.
Conclusions Hyperhomocysteinemia caused choroidal vascular proliferation. VEGF and PlGF might mainly mediate this situation, and PlGF played a key role in that.

• T086

Changes in choroidal thickness and mean ocular perfusion pressure with hemodialysis

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Purpose The goals of hemodialysis (HD) in end-stage renal disease (ESRD) are to remove uremic substances and to control the composition and volume of body fluid. Several associated systemic and ocular hemodynamic changes occurring along with HD have already been described. Our goal was to evaluate the changes in subfoveal choroidal thickness (SFCT) and mean ocular pressure perfusion (MOPP) in HD.
Methods Prospective cohort study including 16 eyes of 16 black patients (8 women) under chronic HD. Macular enhanced depth imaging spectral domain ocular coherence tomography (EDI-OCT) cross scans were performed and IOP measurements obtained using Tonopen® one hour before and one hour after HD. Hemodynamic data was also obtained at both time points. MOPP was calculated as MOPP=2/3(mean arterial pressure) - IOP. The same experienced operator manually measured SFCT using the EDI-OCT built-in caliper. STATA v.13.0 was used as statistical package.
Results Mean age of ESRD patients was 46.81 ± 7.72 [range 28-60] years. The mean time under HD was 17.38 ± 14.67 months. After HD, SFCT increased from 245.38 ± 73.86 µm to 269.13 ± 69.74 µm ($p < 0.001$). Adjusting for age, a linear regression model revealed a strong relationship between SFCT and MOPP with hemodialysis ($p < 0.01$).
Conclusions In our study of ESRD patients, SFCT increased with HD. Shifting of molecules and fluid between the blood and choroidal interstitium during HD may be involved in SFCT changes, which are correlated with MOPP fluctuations.

• T087

Functional end-arterial circulation of the choroid assessed by using fat embolism and electric circuit simulation

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Purpose To investigate the choroidal circulation using the fat embolism model and electric circuit simulation.
Methods Experimental fat embolism was induced by infusing triolein emulsion into the internal carotid artery in cats. Video fluorescein angiography was recorded. The observations were interpreted by using a custom software developed to simulate the choriocapillaris as a schematic electric circuit; electric current for blood flow, voltage for intravascular pressure, and electric resistance for vascular resistance. A dual-layered hexagon was designed to represent the choriocapillaris lobule. The anode and cathodes were connected to the center and periphery of each hexagon, representing the terminal arteriole and draining venules, respectively. Disconnecting the anode simulated choroidal embolism.
Results Perfusion defects were observed in two categories. In the scatter perfusion defects suggesting an embolism at the terminal arterioles, fluorescein dye filled the non-perfused lobule slowly from the adjacent perfused lobule. In the segmental perfusion defects suggesting occlusion of the posterior ciliary arteries, the hypofluorescent segment became perfused by spontaneous resolution of the embolism without subsequent smaller infarction. The findings could be simulated with an electric circuit. Although electric currents flowed to the disconnected hexagon, the level was very low compared with that of the connected ones.
Conclusions The choroid appeared to be composed of multiple sectors with no anastomosis to other sectors, but to have its own anastomotic arterioles in each sector. Blood flows through the continuous choriocapillaris bed in an end-arterial nature functionally to follow a pressure gradient due to the drainage through the collector venule.

• T088

Assessment of chorioretinal blood flow and vessel diameter by laser speckle flowgraphy in three animal models

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Purpose To investigate the differences in optic nerve head (ONH) blood flow and retinal vessel diameter measured by laser speckle flowgraphy (LSFG) in C57 BL/6 (wild type) mouse, Akita (diabetic) mouse, and wild-type monkey models.
Methods LSFG measurements of mean blur rate (MBR), relative flow volume (RFV) and vessel diameter were obtained in 20 C57 BL/6 mice, 10 Akita mice and 8 wild-type monkeys. Comparisons of the three measurements were made between C57 BL/6 and Akita mouse models, and between C57 BL/6 mouse and monkey models using Student's t-test.
Results RFV which measures retinal blood flow, was significantly reduced in one of the retinal veins (V4, $p=0.004$) as well as globally ($p=0.04$) in Akita mice compared to C57 BL/6 mice. There were no significant differences in MBR which is a measure of ONH choioretinal blood flow, or retinal vein diameter between C57 BL/6 and Akita mice. In monkeys, we noted significantly increased MBR ($p<0.001$) compared to C57 BL/6 mice. There were also increased RFV and vein diameter in two of the retinal veins (V4 and V6) as well as globally in monkeys.
Conclusions Diabetic mice had compromised retinal blood flow while maintained similar level of ONH total choroiretinal blood flow compared to wild type mice. This may indicate retinal vessels are more affected by diabetes compared to choroidal vessels. Our data also suggest that ONH total and retinal blood flow and retinal vein diameter were increased in big monkey model compared to small mouse models.

• T089

Retinal vessel parameters in obstuctive sleep apnea

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Purpose Pilot study to explore retinal vessel parameters, calibres as well as vessel reactivity to flicker light provocation in a group of obstructive sleep apnea (OSA) patients.
Methods All patients [n=7] underwent a full eye examination including intraocular pressure measurement, visual field assessment (HFA 30-2 incl. fovea threshold), ocular coherence tomography (Cirrus 3D, Zeiss: optic nerve head and macula centred), retinal photography, dynamic retinal vessel assessment using flicker light provocation (RVA, IMEDOS) and measurement of systemic blood pressure and oxygenation. Central retinal arterial and venous equivalents (CRAE and CRVE) were calculated using optic nerve head centred retinal photographs according to a standardised method, vessel reactivity to flicker light provocation was quantified by calculating the maximum, minimum and peak arterial and venous diameters following flicker light provocation. All data were compared to a group of age and gender matched patients suffering Diabetes Mellitus (DM).
Results OSA patients (mean age: 65 +/-7 yrs) showed significantly better retinal arterial (2.3%) and venous dilation (3.9%) to flicker light provocation compared to those suffering from DM (0.90% and 3.25% respectively). However, CRAE (156 +/-19 au) but not CRVE (218 +/-15 au) of OSA patients was significantly reduced compared to their diabetic counterparts (CRAE: 178 +/-21 au; CRVE: 213 +/-19 au).
Conclusions While OSA patients suffer from endothelial dysfunction, our small sample is a well controlled and motivated group of patients which might in part explain their better dilation capacity. Another explanation might be offered by through vessel calibers: diabetic patients showed markedly larger diameters which could reflect predicated vessels at rest and therefore contribute to a diminished dilatory capacity following flicker light provocation.

• T090

Visualizing retinal vessel dynamics of young type 1 diabetic patients using self-organizing map

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Purpose To reveal possible differences in retinal arterial dynamics between patients with type 1 diabetes (T1D) and healthy subjects using data-driven analysis.
Methods The retinal arterial diameter was measured as a function of time in one eye of 94 T1D-patients (mean age 32 years, range 22-54) and 29 healthy subjects (mean age 33 years, range 24-50) during stable light conditions and flickering light stimulus using Dynamic Retinal Vessel Analyzer (DVA; Imedos GmbH, Jena, Germany). Diabetic retinopathy (DR) of T1D patients was graded using ETDRS classification: 41 without DR, 50 only mild DR and 3 moderate or more severe DR. The raw DVA data was preprocessed and subsequently analyzed with Self-Organizing Map (SOM). SOM is a data-driven method which was here used to cluster DVA time courses of the subjects and to visualize the data in a map-like image.
Results There were differences in retinal arterial response patterns between healthy subjects and T1D patients. The response patterns of the T1D patients seemed milder than those of the healthy subjects. The severity of DR was associated with flatter shape of the response curve. SOM also revealed distinct subgroups among T1D patients.
Conclusions Weaker vascular responses observed in T1D patients as compared to healthy subjects were in line with earlier studies. However, in this series, the interest was to study mostly T1D patients with no or only mild retinopathy, making the detection of differences in artery dynamics challenging. The response patterns of the T1D patients fell into distinct clusters, indicating that there may be other factors explaining the shape of the curves than T1D.

• T091

Coats' syndrome is associated with reduced pressure autoregulation in retinal arterioles

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Purpose Coats' disease is a rare condition characterised by dilatation and hyperpermeability of retinal vessels typically affecting one eye, which may lead to severe visual loss. The disease is treated by retinal photocoagulation, but there is a need for a treatment more targeted at the pathogenic mechanisms of the disease, which are presently unknown.
Therefore, the purpose of the present study was to study the contribution of disturbed pressure and metabolic autoregulation to the pathogenesis of Coats' disease.
Methods Seven patients, three males and four females aged 34.1, 11-69 years (mean,range) affected by Coats' disease in one eye were studied in both eyes using the Dynamic Vessel Analyzer (DVA). Video recordings were used to measure the diameter of larger retinal arterioles during rest, during an increase in the arterial blood pressure by lifting a hand weight and during stimulation of retinal metabolism by flickering light.
Results The resting diameter of retinal arterioles was non-significantly larger (mean±SEM) in the affected eye (133.9 ± 8.3 microns) than in the unaffected eye (118.2 ± 8.6). The contraction of retinal arterioles during increased blood pressure secondary to isometric exercise was not significantly different from zero in arterioles, neither from the affected (0.1 ± 0.3 %) nor from the unaffected (0.2 ± 0.6 %) eye (p=0,93).
Conclusions Coats' disease is accompanied with impaired pressure autoregulation in retinal arterioles, but there is no significant difference between the response in the affected and the non-affected eye. The pathogenesis of Coats' disease is due to other factors than diameter autoregulation in the larger retinal arterioles.

• T092

The assessment of Ocular Blood Flow with Laser Speckle Flowgraphy in healthy Caucasian.

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Purpose To evaluate the reliability and feasibility of the Laser Speckle Flowgraphy (LSFG) measurement of ocular blood perfusion in a group of healthy Caucasian descents and to explicate the age-dependence of the obtained parameters.
Methods A population of 80 eyes of 80 healthy, non-smoking subjects of Caucasian descent aged between 19 and 79 years was included in this cross-sectional study. A commercially available LSFG system was used to measure optic nerve head (ONH) blood flow three successive times in both miosis and mydriasis. The mean blur rate (MBR), a measure of relative blood flow velocity, was obtained for three regions of the ONH. Additional pulse-waveform derived perfusion parameters including blowout score (BOS) and falling rate (FR) were also recorded.
Results The success rate of LSFG measurement was 93.8% in miosis and 98.8% in mydriasis (p=0.004). Measurements of MBR showed excellent repeatability with intraclass correlation coefficients ≥ 0.937 and were not affected by pupil dilation. The majority of pulse-waveform derived parameters showed good repeatability. MBR-related blood flow indices exhibited significant age dependence (p<0.001). FR (r=0.706, p<0.001) and blowout time (BOT; r=-0.698, p<0.001) most strongly correlated with age.
Conclusions LSFG represents a fast and reliable method for the quantitative assessment of ocular blood flow in Caucasian subjects. Our data confirm that the LSFG-derived variables FR and BOT can be useful biomarkers for age-related changes in ocular perfusion.

• T093

Quantitative assessment of retinal permeability in the diabetic Akimba mouse: validation of a promising animal model for diabetic retinopathy

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Purpose Unravelling the pathogenesis of diabetic retinopathy (DR) remains largely elusive, mainly due to lack of reliable diabetic animal models. The Akimba mouse (Ins2AkitaVEGF+/-) was generated by crossing Akita (T1D) with hVEGF-overexpressing Kimba mice. The aim of this study was to validate this innovative diabetic model as a quantitative in vivo screening tool for anti-leakage therapeutics in the context of DR.
Methods Fluorescein angiography (FA) and OCT were implemented to assess retinal permeability and edema in Akimba compared to WT. FITC-BSA perfusion and immunohistochemistry (IHC) were performed as well. Metamorph software (Leica) was used for quantitative analysis. The efficacy of anti-VEGF therapy was investigated in Akimba mice via intravitreal injection of anti-VEGF or vehicle.
Results We report for the first time that quantitative analysis of FA images and FITC-BSA perfused flatmounts revealed a significant increase of vascular leakage in the Akimba eye compared to WT. Analogous to the clinical DR situation, edema can be discerned in OCT scans of Akimba eyes. The effect of anti-VEGF was monitored via longitudinal FA follow-up before and 2-4 weeks after treatment. Anti-VEGF treatment induced a significant decrease in vascular leakage (approx. 35%). IHC stainings confirmed that Akimba also exhibits other DR hallmarks such as inflammation, angiogenesis and fibrosis.
Conclusions Current study demonstrated that the Akimba mouse is a powerful model for screening therapeutics against sight-threatening retinal edema. This diabetic model also exhibits other main DR-related processes, signifying the relevance of the Akimba model for DR research. Further validation will be crucial to strengthen the toolbox of in vivo DR models and ultimately to address the unmet need for effective next generation therapies for DR.
Conflict of interest
Any post or position you hold or held paid or unpaid?:
I'm a scientist working for the Belgian ophthalmology company ThromboGenics NV

• T094

The venous oxygen saturation predicts the visual prognosis after anti-VEGF treatment of central retinal vein occlusion

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Purpose Central retinal vein occlusion (CRVO) is a frequent cause of visual impairment. The visual prognosis is known to be related to the degree of retinal ischaemia which is presently assessed indirectly by the accompanying visual loss. However, the advent of retinal oximetry has introduced a new method for more directly assessing the metabolic consequences of retinal ischaemia.

Therefore, the purpose of the present study was to determine the predictive value of the oxygen saturation in larger retinal vessels for the visual prognosis after treatment with intra-vitreal anti-VEGF medication.
Methods Retinal oximetry was performed in 73 consecutive patients with CRVO (age 71.5, 28-96 years) (mean, range) in one eye referred to the Department of Ophthalmology, Aarhus University Hospital, and the saturation values were related to the visual acuity before and after three monthly injections with anti-VEGF medication.
Results At baseline the oxygen saturation in larger retinal vessels was significantly higher in the affected (101.3±13.0 % for arterioles and 37.1±23.1 % for venules) than in the unaffected eye (96.5±5.3 % for arterioles and 58.0±11.0 % for venules), $p<0.001$ for both comparisons. The visual acuity showed a significantly negative correlation with the oxygen saturation in retinal arterioles ($p=0.013$) and a significantly positive correlation with the oxygen saturation in retinal venules ($p=0.014$). In a linear regression model the oxygen saturation in venules at baseline was predictive for the visual acuity after treatment ($p=0.044$).
Conclusions In CRVO the oxygen saturation in retinal vessels correlates with visual acuity before treatment, and the saturation in venules at baseline can predict the visual outcome after treatment with anti-VEGF medication.

• T095

Retinal venous oxygen saturation in healthy, atrophic and retinal vascular diseases

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Purpose Mean retinal venous oxygen saturation (VSatO2) has been found to be different from normal in several retinal diseases. There are speculations that metabolic imaging of the retina could be helpful in monitoring such diseases and perhaps help with diagnosis. The aim of the study was to characterize normal range of retinal VSatO2and to further examine patients that fall outside normal range.
Methods Retinal vessel oxygen saturation was measured in healthy individuals (n=89), patients with glaucoma (n=78), retinitis pigmentosa (RP, n=10), diabetic retinopathy (DR, n=54) and central retinal vein occlusion (CRVO, n=14). Measurements were performed with a spectrophotometric retinal oximeter, Oxymap T1.
Results Fifty-four healthy individuals were age- and gender matched with DR and CRVO patients. For this healthy group, 5% of VSatO2 were below 38% and 5% of VSatO2 were above 63%. Eleven CRVO patients (79%) had lower than 38% VSatO2. Twenty-five DR patients (46%) had VSatO2 above 63% and the ratio of those outside normal limits increased with severity of retinopathy. Mean VSatO2 was lower in CRVO patients and higher in DR compared to healthy ($p<0.0001$ for both comparisons). Eighty-nine healthy individuals that were 60 years and older were compared to glaucoma and RP patients. In this healthy group, 5% of VSatO2 were above 64%. Six glaucoma (8%) and two RP patients (20%) had VSatO2 higher than 64%. Mean VSatO2 was higher in advanced glaucoma ($p=0.007$) and RP ($p=0.05$) compared to healthy.
Conclusions Most CRVO patients have VSatO2 below the normal limit. Although there is overlap in VSatO2 between patients with DR and normal, a considerable proportion of DR patients fall outside the normal range. Most of the patients with glaucoma and RP were within normal limits for VSatO2.

• T096

Differential hypoxic response of human choroidal and retinal endothelial cells proposes tissue heterogeneity of ocular angiogenesis

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Purpose To elaborate molecular differences between choroidal and retinal angiogenesis by generating and comparatively analyzing human primary choroidal and retinal endothelial cell (CEC and REC) lines
Methods Human CEC and REC were isolated by positive-selection and were cultured. Characterization was performed by immunostaining for endothelial cell (EC)-specific markers. Total RNA and protein were extracted from normoxic or hypoxic CEC and REC cultures. Quantitative PCR arrays were used to comparatively analyze 133 genes between CEC and REC, and the expression differences were calculated by ΔΔCt method. A total of 57 angiogenesis-related protein expression differences were investigated by western blot and proteome profiler, and were calculated by densitometry.
Results Primary human CEC and REC lines stained positively for all EC markers and demonstrated high purity with similar staining and morphology. Under normoxia, CEC showed significantly lower expression levels for cell proliferation and vessel maturation genes and higher expression levels for inflammation-related genes when compared to REC. In response to hypoxia, CEC and REC displayed differential regulation for a multitude of angiogenesis-related genes and proteins. Furthermore, within the vascular endothelial growth factor (VEGF) family, CEC showed preferential upregulation for VEGFA while REC upregulated placenta growth factor (PlGF) levels.
Conclusions Differential normoxic and hypoxic regulation of angiogenesis-related factors by CEC and REC outlines tissue heterogeneity of ocular angiogenesis and suggests that tissue specificity should be considered as a novel treatment modality for successfully overcoming choroidal and retinal angiogenic conditions in the clinic.

• T097

Vessel Diameter Study: Intravitreal Versus Posterior Subtenon Triamcinolone Acetonide Injection For Diabetic Macular Edema

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Purpose To detect and compare the vessel diameter effect of intravitreal versus subtenon injection of triamcinolone for diabetic macular edema (DME).
Methods Sixty patients with DME who underwent triamcinolone injection either intravitreally (N=30) or under the tenon capsule (N=30) were included. Non-injected fellow eyes served as control. The main outcome measures were central retinal artery equivalent (CRAE), central retinal vein equivalent (CRVE), and artery-vein ratio (AVR).
Results In the intravitreal group, pre-injection mean CRAE (147.07µ) decreased to 141.03µ at 1 week and to 139.43µ at 1 month (P<0.001) while baseline CRVE (209.61µ) decreased initially to 198.85µ at 1 week then to 198.49µ at 1 month (P<0.001). In the subtenon group, pre-injection CRAE (152.18µ) decreased to 149.49µ at 1 week and to 147.47µ at 1month (P=0.017) while baseline CRVE (215.60µ) decreased initially to 208.69µ at 1 week then to 207.25µ at 1month (P=0.003). Pre-injection AVR values did not change at 1 week and at 1 month in both injection groups (P=0.66 and P=0.196, respectively). In the control group, none of the 3 parameters changed throughout the study period compared to the baseline (P>0.28).
Conclusions In eyes with DME, both intravitreal and subtenon triamcinolone injection led to a significant constriction of retinal arteries and veins

• T098

The preventive effects of the rhodiola rosea on ischemia-reperfusion injury in the RAT retina

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Purpose The aim of the present study is to evaluate the preventive effects of Rhodiola Rosea, a naturally occurring antioxidant and neuroprotective, on ischemia-reperfusion (IR) induced damage in rat retina.
Methods Forty-eight Sprague-Dawley rats were randomly divided into 3 groups. Control group (n=16) just received anterior chamber cannulation. IR group (n=16) was exposed IR injury created by increased intraocular pressure. The third group (IR+T) (n=16) received daily intraperitoneal Rhodiola Rosea extract in addition to IR injury. Rats in each group were sacrificed at 24th hour (n=8) and 7th day (n=8). Retinal catalase, malondialdehyde and glutathione peroxidase were measured. Retinal sections were stained with hematoxylin-eosin. Terminal deoxynucleotidyl transferase dUTP nick-end labeling (TUNEL), TNF-α and NF-κB immune staining were also performed.
Results There was no significant difference among the groups in terms of catalase and glutathione peroxidase (p>0.05). MDA levels were significantly higher in the IR group on 24th hours and 7th day compared to control group. There was no ganglion cell count difference between control and IR+T group at 24th hour and day 7 (p>0.05). There were statistically significant difference between control and IR group at 24th hour and at day 7 in terms of ganglion cell counts (p=0.001 for both). When IR and IR+T are compared, TUNEL positive cells at 24th hour were significantly higher in IR group in the ganglion cell layer and inner nuclear layer (p=0.001 for both). NF-κB positive cells in the ganglion cell layer and inner nuclear layer were significantly lower in IR+T group compared to IR group at 24th hour (p=0.001 for both).
Conclusions Rhodiola Rosea extract was shown to have partially preventive effects on retinal ischemia reperfusion injury in rats in terms of biochemical and histopathological outcomes.

• T099

Experimental study of intraocular temperature distribution in the rabbit under various environmental conditions

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Purpose To study ocular temperature distribution in the rabbit in dependence on ambient temperature in experiment.
Methods To measure ocular temperature a thermoelectric device was developed; the latter consisted of a temperature recording microprocessor module, polytetrafluoroethylene microprobes (diameter - 0.6 mm) with thermocouple sensors, computer software for visualization and registration of temperature parameters in real time. The device allows measurements in the temperature range from 10 °C to 120 °C with ± 0.05 °C accuracy. The experiment was conducted on 21 rabbits (42 eyes) which were divided into 3 groups. Group 1 consisted of 11 rabbits (22 eyes) ocular temperature measurements of which were made at ambient temperature with the range of 23 °C to 24,5 °C while Group 2 and 3 consisted of 5 rabbits (10 eyes) each with ambient temperatures with the range of 14.5 °C to 15.5 °C and 30 °C to 32 °C, respectively.
Results The lowest temperature was noted on the outer corneal surface, and then it increased gradually in the inner segments of the eye and reached its maximum in the retina and subtenon space. A temperature gradient between the outer corneal surface and the retina was 3.23 °C, 4.68 °C and 3.85 °C in Group I, II and III, respectively. No significant difference between temperatures in the left and right eyes of the experimental animals was observed. Data obtained in this study show the lowest correlation between temperatures of the anterior corneal surface and retina. The high correlation was observed between temperatures of inferior conjunctival fornix and retina.
Conclusions Raising and lowering of the ambient temperature increases the temperature gradient between the external and internal structures of the rabbit eye.

• T100

The Anti-angiogenic Effects of Gold Nanoparticles on Experimental Choroidal Neovascularization in Mice

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Purpose To evaluate the anti-angiogenic effect of gold nanoparticles (AuNPs) on experimental choroidal neovascularization (CNV) in mice.
Methods CNV was induced by rupturing Bruch's membrane using laser photocoagulation in C57BL/6 mice. The following day, intravitreal AuNPs injections were administered. Two weeks after laser injury, CNV lesions were evaluated by examination of choroidal flat-mounts using fluorescein-labeled dextran and immunofluorescence staining with isolectin B4. The effects of AuNPs on endothelial cell tube formation, proliferation, and cytotoxicity were evaluated using human umbilical vein endothelial cells (HUVECs) or human retinal pigment epithelial cells (PRE). The activity of ERK1/2, Akt, and FAK signaling pathways were also analyzed.
Results AuNPs reduced the extent of CNV. Mice treated with intravitreal AuNPs injections exhibited a 67.9% reduction in the extent of CNV lesions compared to the control group ($P < 0.001$). The size of the isolectin B4-labeled area was also significantly smaller in AuNP-treated groups ($P < 0.001$). AuNPs decreased vascular endothelial growth factor-induced HUVEC tube formation and proliferation in a dose-dependent manner, but showed no cytotoxicity with the treatment doses administered. The phosphorylation of ERK1/2, Akt, and FAK were also suppressed by AuNPs.
Conclusions AuNPs can inhibit laser-induced CNV in mice and may have therapeutic potential for the treatment of CNV development secondary to neovascular AMD.

• T101
RESVEGA in exudative age-related macular degeneration

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Purpose The aim of this clinical case is to present the improvement of retinal structure and stabilisation of visual acuity using RESVEGA (trans-resveratrol and omega-3 fatty acids i.a.) in a patient with exudative AMD.
Methods A 84-year-old female patient with pseudophakia and history of dry AMD in both eyes and atrophic changes in the left eye presented in mid-January 2015 with deterioration of vision in the right eye. VOD: 0.1, no improvement with correction; VOS: counts fingers from 1.5 m. In the OCT: subretinal fluid, suspected CNV in the right eye, atrophic changes in the left eye. Recommended: fluorescein angiography, qualification for intravitreal anti-VEGF injection into RE and supplementation with RESVEGA (2 tablets daily at once).FFA – increasing hyperfluorescence in the RE macula, leakage from CNV and changes of atrophic character in the course of AMD. February 2015 (qualification for intravitreal anti-VEGF injection): RE: significant improvement in OCT, decreased fluid space under the sensory retina. VOD, VOS as previously. Injections were abandoned; recommended: continued supplementation with RESVEGA, frequent ophthalmic examinations. Mid-March 2015: in the OCT no fluid spaces. VOD, VOS as previously. Recommended: observation and continued supplementation as so far. September 2015: in the OCT – no fluid spaces. VOD, VOS as previously.
Results Owing to the use of RESVEGA, regression of the subretinal fluid was obtained. It was possible not to introduce the intravitreal anti-VEGF injection. The oral therapy ensured maintaining stable ophthalmological status and visual acuity on the same level within 9 months of observation.
Conclusions RESVEGA supplementation allowed to maintain stable condition of patient's eyes, without anti-VEGF injection.

• T102
Variation of accommodative process and anterior chamber parameters in diabetic patients

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Purpose Chronic hyperglycemia is responsible for vascular and neurodegenerative retinal changes in diabetic patients. However, other eye structures have been also associated with changes, such as corneal biomechanics and lens thickness.
The author's objective was to analyze the accommodative process – crystalline structural change and pupillary diameter based on Anterior Segment Optical Coherence Tomography (AS-OCT).
Methods Prospective case-control study. The anterior chamber parameters were studied using AS-OCT. The monocular accommodative process was obtained with different Dioptric Powers (0 D, 2.5 D, 5 D and 7 D – lens integrated in the OCT software) in both controlled photopic and scotopic conditions. 2 groups have been analyzed: group 1 with type 2 diabetic patients and group 2 with healthy-controls. Measurements of anterior chamber depth (ACD), lens vault (LV), pupillary diameter (PD) and iris thickness (IT) were obtained.
Results A total of 71 patients were evaluated (group 1 – n = 36; group 2 – n=35). The mean age was 69.15±5.55 years. Diabetic patients have showed the basal highest LV and lowest ACD values, with statistically significance ($p<0.05$). In highest accommodative power, group 2 has experimented a significant reduction in ACD, ACA and PD ($p<0.05$). The LV change has not proved important in the process. Group 1 has showed a significant response in scotopic conditions, even with a lower response with the highest accommodative stimuli compared to group 2.
Conclusions The accommodative process is impaired in diabetic patients, with a significant difference in pupillary response more than in lens vault. This could be important to explain the importance of the anterior segment of crystalline in accommodation. Further studies will be necessary to clarify the DM effects on these parameters.

• T103
In the search of biomarkers for thyroid associated orbitopathy (TAO)

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Purpose Tears are known as lubricating the eyes and ensuring nutrition and protection of the surrounding ocular tissues. However, its composition is the result of a dynamic system, which is dependent on various stimuli, including ocular and systemic diseases. Here, we propose that, tears could represent an innovative source of biomarkers in thyroid-associated orbitopathy (TAO) disease
Methods Schirmer's test was adopted to collect tears from TAO (N =20, 3 males, mean age (±SD): 46.0 years (±13.0)) and healthy patients (N =18, 8 males, 45.4 years (±18.7)). Independent isobaric proteomics experiments were carried out and analyzed on a linear trap quadrupole Orbitrap Velos Pro. Easyprot software was used to obtain protein identification and quantification (2 unique peptides, 1% FDR, ratio<0.66 or >1.5, p-value>0.05). Biological process and pathways were analyzed using Ingenuity pathway analysis software (6.7 version). Verification of proteins was performed by Western Blot or immunoassays.
Results Globally, 646 proteins were identified and 62 were considered as differentially expressed (27 up-and 35 downregulated). Interestingly, among them, the acute phase response signalling and glycolysis pathways were mainly represented. Verification is ongoing for these candidates. In parallel, we observed that the levels of IL-6, IL-10, IL-12 and TNF-α, were significantly upregulated in tears of TAO patients.
Conclusions These results confirmed tears as a suitable source to discover biomarkers for TAO disease. Moreover, the emergence of proteins involved in the glycolysis, associated to inflammation, could bring new general knowledge about TAO that still remains not well characterized.

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• T104
Mechanisms of ocriplasmin uptake by retinal cells

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Purpose Retinal cells participate in the transport and clearance of therapeutics. In this study, we used ***in vitro*** retinal cell models to investigate the uptake and transport of ocriplasmin, a protease used for the treatment of vitreomacular traction.
Methods Cultures of primary porcine Müller and human ARPE-19 cells were incubated with Alexa488-labeled ocriplasmin or its inactive form for up to 3h. Spatial distribution and colocalization with vesicle transport proteins were assessed at several time points.
Results Ocriplasmin was rapidly detected in Müller and RPE cells. Uptake was observed as cytoplasmic foci and confirmed by confocal microscopy. In contrast, enzymatically inactive ocriplasmin was taken up at a significantly slower rate. Given its focal cytoplasmic distribution, we investigated whether ocriplasmin was present in cellular transport organelles. In Müller cells, ocriplasmin colocalized partly with Rab5-positive early endosomes and Rab7-positive lysosomes but with very few Rab11-positive recycling endosomes. In RPE cells, ocriplasmin also colocalized in part with early endosomes and lysosomes, but to a larger extent with recycling endosomes.
Conclusions Taken together, our data indicate that ocriplasmin can be taken up by Müller and RPE cells and that this uptake depends in part on its enzymatic activity. Ocriplasmin was found in transport vesicles, indicating active transport mainly through the degradation pathway in Müller cells whereas in RPE cells, outward transport is preferred. It is described that RPE cells transport anti-VEGFs which emphasizes their role in retinal drug clearance. Our study suggests that retinal cells might participate in ocriplasmin drug clearance. Further ***in vivo*** studies will need to assess the ocriplasmin transport in the retina as well as the impact of uptake on ocriplasmin activity.

Conflict of interest
Any post or position you hold or held paid or unpaid?:
ThromboGenics's employee

• T105

Light-induced oxidative stress production in the rod outer segments

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Purpose Oxidative stress is involved in retinal diseases such as diabetic retinopathy, age-related macular degeneration and retinal damage by light, characterized by Reactive Oxygen Intermediates (ROI) production. Rod Outer Segments (OS), display a mitochondria-like activity, producing ATP and consuming oxygen through the expression of the electron transfer chain (ETC) complexes I–IV and F1Fo-ATP synthase. As the ETC is a major source of ROI generation, here we investigated the ultimate ROI source in the OS after blue light (BL) or ambient light irradiation.
Methods Samples were: purified bovine OS and organotypic model of photoreceptors (from C57BL/6 mice) irradiated with BL (peak, 405 nm). Histochemical assays were conducted on unfixed eye culture sections. To test ROI, 5-(and-6)-chloromethyl-2',7'-dichlorodihydrofluorescein diacetate was used both for cyofluorimentric assay in purified OS and for live staining of retinas explanted from eye cultures. Oxidative metabolism was investigated by ATP synthesis and oximetry in purified OS. Malondialdehyd (MDA) concentration in OS homogenates was evaluated.
Results Under BL stress, ROI and MDA production increased while O2 consumption and ATP synthesis were impaired in OS after 6 h BL treatment. Impairment of respiratory Complexes I and II after BL exposure, both in the OS and IS was found. In ambient light, purifed OS, even in the absence of respiring substrates, produced a consistent amount of ROI, while in the dark, OS ATP synthesis is negligible.
Conclusions Likely, severe malfunctioning of OS aerobic respiratory capacity after BL treatment is secondary to a self-induced damage after initial over-functioning of both phototransduction and respiratory chain, with ROI production. Correlation among ROI production and phototransduction activity as well as possible antioxidant supplementation are discussed.

• T106

Upregulated expression of proteolytic enzymes in the cultured retinal pigment epithelial cells of minipig transgenic for the human mutated huntingtin

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Purpose Huntington´s disease (HD) belongs to the hereditary neurodegenerative disorder that is caused by an expansion of a polyglutamine (polyQ) domain in the protein of huntingtin (Htt). Since mutant Htt (mtHtt) and especially their small proteolytic fragments are very toxic to all HD cells (particularly those of neuroectodermal origin such as neurons or retinal pigment epithelial cells), it has been suggested that upregulated proteolysis of mtHtt plays a crucial role in the HD pathogenesis including damage of the retina. Therefore, the purpose of the present study was to investigate the possible participation of the proteolytic enzymes from the group of caspases, matrix metalloproteinases (MMP), calpains in HD pathology of retinal pigment epithelial cells.
Methods In this study we used wild type (WT) and transgenic minipigs for N-terminal part of the human mtHtt (TgHD) (548aaHTT-145Q, F2 generation age 36 and 48 months, respectively). Proteases were examined in cultured retinal pigment epithelial cells immunocytochemically (ICC) or biochemically by western blotting (WB) using the following primary antibodies: anti-caspase-3, anti-caspase-8, anti-calpain-5, anti-MMP-9.
Results Using biochemical and immunocytochemical analysis, we detected increased expressions of caspase-3, caspase-8, matrix metalloproteinase-9, calpain-5, and probably its multiple proteolytic cleavage products (generated from mtHtt) in cultured RPE cells of TgHD minipigs in comparison to WT animals.
Conclusions Increased expression of proteolytic enzymes in TgHD RPE cells can contribute to the retinal damage during development of HD.

• T107

The effect of systemic alfuzosin hydrochloride on choroidal thickness and pupil diameter sizes

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Purpose To evaluate and investigate the effects of α1-adrenoceptor antagonist alfuzosin hydrochloride on anterior and posterior segment findings using Sirius Scheimpflug/Placido photography-based topography system and enhanced depth imaging spectral-domain optical coherence tomography (EDI-OCT).
Methods This prospective study was performed with newly diagnosed benign prostatic hyperplasia, 25 eyes of 25 patients, initiated alfuzosin hydrochloride, were evaluated in this study. Anterior segment and posterior segment findings were noted at baseline, 1st and 3rd month. Results were compared statistically.
Results The mean subfoveal choroidal thickness 274.05 µm, and the mean 3 mm nasal thickness to the fovea 267.80 and the mean 3 mm temporal thickness to the fovea was 269.10 µm at baseline and they were 275.7 µm, 269.15 µm and 270.85 µm at 1st month and they were 278.10 µm, 271.40 µm and 273.25 µm at 3rd month, ($P<0.05$, for all). The mean schirmer test values were 13.75-12.15 and 11.40 mm (respectively, at baseline, 1st and 3rd month)($P<0.001$). Besides, the mean scotopic and photopic pupil diameter values were 7.91 and 4.88 mm at baseline, and they were 7.47 mm and 4.38 mm at 1st month and 6.62 mm – 3.55 mm at 3rd month ($p<0.001$).
Conclusions Alfuzosin caused a significant increase in choroidal thickness measurements. It was determined that significant decreases of scothopic and photopic pupil diameter sizes in pupillography, this reductions can be considered that alfuzosin may effect pupil size with blockade α-adrenoceptors in iris dilator muscle of humans

• T108

A 5-minute time interval between two different dilating eyedrops increases their combined effect

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Purpose Patients are usually advised to wait 5 minutes between eyedrops. This delay supposedly allows the first drop not to be washed out by the second one, thereby increasing the combined effect. However, in the only experimental study conducted in humans on the concurrent administration of two different eyedrops, the authors concluded that a five- minute time interval between eyedrops did not increase their combined effect. Our study was designed to reassess this puzzling conclusion.
Methods Using digital photographs shot in photopic conditions in 40 eyes of 20 healthy volunteers, we compared relative pupil surface (i.e. pupil to iris surface area ratios) before and after the administration of one drop of 10% phenylephrine and one drop of 0.5% tropicamide either immediately or after a 5-minute time interval.
Results Waiting five minutes yielded a 5.6% relative pupil surface gain ($p<0.001$) indicating an additional combined effect with a 5-minute time interval.
Conclusions This prospective blind study is the first to show in humans that waiting five minutes between two different eyedrops increases their combined effect. This conclusion is probably the result of methodological refinements including challenging of the mydriasis by photopic conditions and use of pupil and iris surface areas, which may show differences that would be undetectable in terms of diameter.

• F001

Automated evaluation of peripapillary choroidal thickness in nonarteritic anterior ischemic optic neuropathy

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Purpose To compare peripapillary choroidal thickness (PTC) between eyes with nonarteritic anterior ischemic optic neuropathy (NAION), contralateral uninvolved eyes and masked healthy eyes by age using the automated choroidal segmentation provided by Swept Source Optical Coherence Tomography (SS-OCT Triton, Topcon, Japan).
Methods 23 eyes with NAION, 15 uninvolved fellow eyes, and 28 healthy eyes were included in this cross-sectional observational study. .Automated choroid segmentation by SS-OCT was performed for a minimum of 6 months after the acute event.
The Bruch´s Membrane Opening based optic nerve area and peripapillary RNFL thicknesses were evaluated using SD-OCT Spectralis (Heidelberg Engineering GmbH, Heidelberg, Germany). The association between PCT and other potential confounding variables including age, gender, axial length, intraocular pressure and disc area was examined using univariable and multivariable regression analyses.
Results The mean PCT in the NAION eyes, unaffected fellow eyes, and control group were 121.91± 69.7 µm , 133 ± 53 µm, and 116.2 ± 47.1 µm, respectively (ANOVA, p= 0.52). All peripapillary RNFL thicknesses (average and regional) were significantly thinner in NAION eyes compared with unaffected and healthy eyes (P= 0.000). Older age was significantly associated with a thinner mean PCT (rho -0.555, P = 0.000).
Conclusions Although controversial regarding PCT in NAION exists in the literature using manual measurements, in the current study automated analysis did not find any significant differences in NAION eyes compared to both unaffected fellow eyes and control eyes.

• F002

Optical coherence tomography in patients with amyotrophic lateral sclerosis

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Purpose To correlate OCT parameters Macular Thickness (MT), Ganglion Cell Layer (GCL) and Retinal Nerve-Fiber Layer (RNFL), in mild Amyotrophic Lateral Sclerosis (ALS) in comparison with age-matched controls.
Methods In a prospective study, 9 ALS patients in the first year of diagnosis were compared with 11 age-matched healthy controls. All patients underwent a complete neurological and ophthalmological examination and spectral domain OCT Cirrus HD, using Optic Disc Macular Cube 200x200 and 512x128 Cube scanning protocols.
Results The OCT measurement showed a statistically significant increase of MT in the superior, nasal, and inferior perifoveal areas ($p<0.05$, in all cases). A non-significant decrease of GCL was observed ($p>0.05$). RNFL registered a non-significant increase in the temporal quadrant, corresponding to papillo-macular bundle, and a decrease in the remaining quadrants, while the nasal quadrant proved statistically significant ($p<0.05$). ALS patients underwent a significant decrease (18%) in sectors 2 and 6 compared to controls ($p<0.05$).
Conclusions MT increases in ALS patients, probably due to a process of reactive gliosis. Furthermore, the nasal papilla thins in ALS patients, presumably because of a loss of ganglion cells. This is the first report available which classifies ALS patients by the time course of the disease and describes these changes in the macula, in correlation with early changes in retina previously shown in pathological studies.

• F003

Retinal nerve fiber layer atrophy in patients with multiple sclerosis: Longitudinal 5 years study

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Purpose To evaluate changes in the retinal nerve fiber layer (RNFL) thicknesses in multilple sclerosis (MS) patients compared with healthy subjects during 5 years of follow up. To compare ability of optical coherence tomography (OCT) and visual field test to detect axonal damage.
Methods Fifty eyes of 50 MS patients and 50 eyes of 50 healthy controls were included. All of them underwent measurements of best corrected visual acuity (BCVA) refractive defect, color vision, visual field, and OCT (Spectralis OCT). All of them were annual re-evaluated during 5 years. Change in both groups (MS patients and healthy controls) were evaluated and compared using paired T Student´s test.
Results We found decrease in all RNFL thicknesses during the 5 years follow-up in both groups (patients and controls), and the changes were significant higher in MS group (T Student´s, $p\leq0.05$). No differences were found between patients and controls in visual functional tests (BCVA, color vision test and visual field). Higher change was found in inferior quadrant (113.67 in baseline and 105.39 µm in 5 years visit in MS group, $p<0.001$). Correlations between structural and functional tests were found, but not between the changes in both tests during the 5 years follow up.
Conclusions MS progression causes axonal damage that can be detected by OCT but not by visual functional tests.

• F004

Assessment of visual function and structural retinal changes in Zen meditators

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Purpose To evaluate whether Zen meditation (a mindfulness-based practice) stimulates visual function and increases retinal and retinal nerve fiber layer (RNFL) thickness.
Methods This cross-sectional controlled study included 36 eyes of 18 meditators and 76 eyes of 38 age- and sex-matched healthy non-meditators. The average response of both eyes in each subject was analysed. All subjects underwent evaluation of high and low contrast visual acuity (using ETDRS charts), contrast sensitivity vision (CSV) using the Pelli Robson chart and CSV 1000E test, color vision (using the Farnsworth and L´Anthony desaturated D15 color tests), stereoscopic vision using the TNO test, and retinal and RNFL thickness using optical coherence tomography (OCT). Differences in visual function and RNFL thickness were compared between groups.
Results We found that meditators exhibited significantly better visual acuity with the three contrast levels used, and significantly better contrast sensitivity vision (CSV 1000E) than healthy non-meditators ($p\leq0.05$). Retinal and RNFL structural measurements did not differ significantly between groups. Ganglion cell layer thickness was moderately correlated with visual acuity, CSV, color vision, and stereoscopic vision ($p\leq0.05$; $r > 0.6$).
Conclusions Visual function was enhanced in meditators without significant alterations in the retinal morphologic structure. Further studies are needed to determine whether there is a causal association between mindfulness and visual function improvement.

• F005

Reduction in peripapillary retinal thickness after Thalidomide Treatment in Patients with POEMS Syndrome

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Purpose To determine whether thalidomide treatment can reduce the optic disc edema in patients with the polyneuropathy, organomegaly, endocrinopathy, monoclonal gammopathy, and skin changes (POEMS) syndrome.
Methods This was a retrospective, observational case series. We studied 14 eyes of 7 treatment naïve patients with POEMS syndrome. Thalidomide treatment was initiated with 100 mg daily and thalidomide dose was subsequently increased to 300 mg daily and 12 mg/m2 dexamethasone was combined on 4 days of monthly intervals. The peripapillary retinal thickness (pRT) thickness was determined by spectral-domain optical coherence tomography (SD-OCT) to assess the degree of optic disc edema. The pRT thickness were measured at the baseline and 6 months after the thalidomide treatment. The SD-OCT examinations consisted of circle scans of 3.45 mm diameter centered on the optic disc. The serum level of VEGF was also determined by enzyme-linked immunosorbent assays (ELISAs) at the baseline and 6 months after beginning the treatment. The Wilcoxon signed-rank test was used to determine if the differences between the pRT at the baseline and 6 months after the treatment were significant. We also determined if the differences in the serum levels of VEGF at the baseline and 6 months after the treatment were significant.
Results At the baseline, the mean pRT was 674.7 ± 300.3 μm and the mean serum level of VEGF was 5902 ± 2237 pg/ml. At 6 months after the treatment, the mean serum level of VEGF was significantly decreased to 1491 ± 2062 pg/ml ($P<0.01$) and the pRT was significantly decreased to 356.5 ± 108.2 μm ($P<0.01$).
Conclusions Our results showed that thalidomide treatment reduced the peripapillary retinal thickness together with a decrease in the serum VEGF levels. These findings suggest that the optic disc edema might be due to elevated serum levels of VEGF.

• F006

Visual dysfunction and retinal changes in patients with multiple sclerosis

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Purpose To evaluate structural changes in the retina and their correlation with visual dysfunction in patients with multiple sclerosis.
Methods Patients with multiple sclerosis (n=84) and healthy controls (n=84) underwent structural evaluation of the retinal nerve fiber layer, and macular and ganglion cell layer thicknesses using Spectral domain optical coherence tomography (SD-OCT). All subjects underwent high and low contrast visual acuity, color vision (using the Farnsworth and L´Anthony desaturated D15 color tests), and contrast sensitivity vision using the Pelli Robson chart and CSV 1000E test.
Results Macular, retinal nerve fiber layer, and ganglion cell layer thinning was observed in multiple sclerosis patients compared to healthy controls ($p<0.05$). High and low contrast visual acuity and contrast sensitivity vision at four different spatial frequencies were significantly reduced, compared with healthy subjects ($p<0.05$). Macular, retinal nerve fiber layer and ganglion cell layer measurements correlated with high and low contrast visual acuity, and contrast sensitivity vision. Contrast sensitivity vision was the functional parameter that most strongly correlated with the structural measurements in multiple sclerosis and was associated with ganglion cell layer measurements. The L´Anthony color vision score (age-corrected color confusion index) was associated with macular measurements.
Conclusions Patients with multiple sclerosis had visual dysfunction that correlated with structural changes evaluated by SD-OCT. Macular and ganglion cell layer measurements may be good indicators of visual impairment in multiple sclerosis patients.

• F007

Effects of current treatments in progressive retinal nerve fiber layer loss in multiple sclerosis patients

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Purpose To evaluate progressive changes in the retinal nerve fiber layer (RNFL) in patients with multiple sclerosis (MS) to assess the possible neuroprotective role of different frequently used therapies in this disease.
Methods 104 patients with MS underwent a complete ophthalmic evaluation including structural assessment of the RNFL thickness using Spectral domain Optical coherence tomography (SD-OCT). All subjects were re-evaluated after 5 years to quantify structural changes. Changes were compared between treated and untreated patients, between different therapies and between intramuscular (IM) interferon (IFN) beta-1a (Avonex) and other frequently prescribed treatments (subcutaneus IFN beta-1a, IFN beta-1b, glatiramer acetate, metoxantrone and natalizumab).
Results Significant thinning of the peripapillary RNFL thickness was observed at 5-year follow-up in all patients ($p<0.001$). A significant loss in the RNFL thickness (inferior sector, $p=0.002$) was observed in the treated group compared to untreated patients. No significant differences were found between therapies when single groups of treatments were compared. Progressive RNFL loss was observed in the glatiramer acetate group over the IM IFN beta-1a group ($p=0.002$). A clear tendency towards a greater axonal loss was observed in the IFN beta-1b, the glatiramer acetate and the SC IFN beta-1a group compared to IM IFN beta-1a treatment.
Conclusions IM IFN beta-1a may have a neuroprotective effect over progressive axonal degeneration in MS patients compared to other current therapies. These patients present progressive axonal loss detected by the analysis of the RNFL using OCT which may be useful to evaluate disease progression and effectiveness of current MS therapies.

• F008

Evaluation of progressive visual dysfunction and degeneration of the retinal nerve fiber layer and macular thickness in patients with Parkinson disease.

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Purpose To quantify changes in visual function parameters, in the retinal nerve fiber layer (RNFL) and macular thickness of patients with Parkinson disease (PD) over 5 years.
Methods Thirty patients (60 eyes) with EP and 30 healthy subjects (60 eyes) underwent a complete ophthalmic evaluation, including assessment of visual acuity (VA) with ETDRS chart, contrast sensitivity vision (CSV) with Pelli Robson and CSV 1000E tests, color vision with Farnsworth and Lanthony D15 tests and retinal evaluation using Spectral domain Optical coherence tomography (SD-OCT).
All subjects were reevaluated after 5 years to quantify changes in visual function parameters, the RNFL and macular thickness.
Results Changes were detected in visual function parameters (VA, CSV and Lanthony color indexes; $p<0.05$) and RNFL thickness (inferotemporal, superotemporal and temporal sectors; $p<0.001$) in PD patients compared to controls. Greater changes in VA, CSV and color vision ($p<0.05$) were detected during the follow-up in the PD group compared to healthy subjects. Greater loss of the RNFL (superotemporal and temporal sectors; $p<0.001$) and macular thickness (all sectors except inner superior and inner inferior sectors, $p<0.001$) was observed in the patients group after the 5-year follow-up.
Conclusions Progressive visual dysfunction, macular thinning and axonal loss can be detected in PD patients. Analysis of the macular thickness and the RNFL by SD-OCT can be useful for evaluating PD progression.

• F009

Visual dysfunction and its correlation with retinal changes in patients with Alzheimer´s disease

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Purpose To evaluate visual dysfunction and its correlation with structural changes in the retina in patients with Alzheimer´s disease (AD).
Methods Patients with AD (n=24) and controls (n=24) underwent evaluation of visual acuity (VA), color vision (using the Farnsworth and L'Anthony desaturated [D]15 color tests), and contrast sensitivity vision (CSV; using the Pelli-Robson chart and CSV-1000E test) to measure visual dysfunction. Structural measurements of the retinal nerve fiber layer (RNFL) and macular thickness were obtained using spectral domain-optical coherence tomography (SD-OCT).
Results CSV at three of the four spatial frequencies was significantly worse in AD patients than in controls. Color vision was significantly affected in AD patients based on the Farnsworth color test. Compared with controls, macular thinning was detected in all sectors except the fovea, and the RNFL exhibited significant thinning in the superior quadrant and lower average thickness (p<0.05). CSV was the functional parameter most strongly correlated with structural measurements in patients with AD. Color vision was strongly associated with macular volume (r >0.70, p<0.05). VA at different levels of contrast was associated with macular and RNFL thickness.
Conclusions Patients with AD had visual dysfunction that correlated with structural changes evaluated by SD-OCT. Macular measurements may be reliable indicators of visual impairment in AD patients.

• F010

Visual dysfunction and its correlation with retinal changes in patients with Parkinson disease

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Purpose To evaluate visual dysfunction and its correlation with structural changes in the retina in patients with Parkinson disease (PD).
Methods Patients with PD (n=37) and controls (n=37) underwent visual acuity (VA), color vision (using the Farnsworth and L´Anthony desaturated D15 color tests), and contrast sensitivity vision (CSV; using the Pelli Robson chart and CSV 1000E test) evaluation to measure visual dysfunction. Structural measurements of the retinal nerve fiber layer (RNFL), and macular and ganglion cell layer (GCL) thicknesses were obtained using spectral domain optical coherence tomography (SD-OCT). Comparison of obtained data and correlation analysis between functional and structural results were performed.
Results VA (in all different contrast levels) and all CSV spatial frequencies were significantly worse in PD patients than in controls (P < 0.05). Color vision was significantly affected (p<0.05) based on the L´Anthony color test. Macular thinning was detected in the central, outer (inferior and temporal), and superior (inner and outer) sectors (p<0.05), and the RNFL had significant thinning in the temporal quadrant (p<0.05). Significant GCL loss was observed in the superior and superonasal sectors and the minimum GCL + inner plexiform layer (p<0.05). CSV was the functional parameter most strongly correlated with structural measurements in PD. Color vision was associated with most GCL measurements. Macular thickness was strongly correlated with macular volume and functional parameters (r >0.70, p<0.05).
Conclusions Patients with PD had visual dysfunction that correlated with structural changes evaluated by SD-OCT. Macular and GCL measurements may be reliable indicators of visual impairment in PD patients.

• F011

Optical Coherence Tomography to distinguish parkinson disease versus supranuclear progressive palsy

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Purpose The aim of the study was to examine patterns of peripapillary andretinal layer damage as a potential marker of neurodegeneration in Parkinson'sdisease (PD) compared to progressive supranuclear palsy (PSP) with 2 SD- OCTdevices.
Methods Peripapillary retinal nerve fiber layer (pRNFL), macular thickness (MT) and ganglion cell layer inner plexiform analysis (GCA) by Cirrus and pRNFL analysis and automaticsingle retinal layers macular segmentation by Spectralis were used to evaluate38 patients with PD and 15 patients with PSP.
Results Mean average and superior RNFL by Cirrus were thicker in PD compared to PSP (P=0.001). The mean central, superior, supero-temporal and infero-temporal RNFL thicknesses by Spectralis were also significantly higher in PD compared to PSP (P<0.05). Using Cirrus OCT, mean MT and all measurements by GCA were significantly higher in PD compared to PSP (P<0.002). The AUC was larger for minimum GCIPL (0.912) than for average GCIPL thickness (0.850). A minimum GCIPL thickness cut-off value of 69 µm, was able to differentiate PSP from PD (Sensitivity: 91.7%; Specificity: 72.7%). Minimum and average GCIPL thicknesses significantly correlated with Hoehn and Yahr score (P<0.05), and with UPDRS (Unified Parkinson's Disease Rating Scale) (P<0.005).
Conclusions Thedifferential diagnosis of Parkinsonian disorders is clinical one and not alwayseasy, especially at the onset of disease. In thecurrent study, the minimum GCIPL thickness was the most sensitiveparameter to differentiate PD from PSP and it was significantly correlated withneurological score. These findings may facilitate the differential diagnosisand give insight into the degenerative processes of atypical parkinsonian syndromes.

• F012

Analysis of retinal and choroidal thickness in the macular area in patients with Parkinson´s disease using swept-source optical coherence tomography

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Purpose To analyze the retinal and choroidal thickness in the macular area in patients with Parkinson´s disease (PD) using swept-source optical coherence tomography (SS-OCT) as a marker for neurodegenerative injury.
Methods 108 eyes of patients with PD and 90 eyes of healthy controls were included. All subjects underwent ophthalmologic evaluation including retinal and choroidal assessment using SS-OCT Triton (Topcon), 3DH Wide protocol. Macular ETDRS data were analyzed, including retinal and choroidal thickness evaluation.
Results Patients with PD revealed significant thinning compared to healthy controls concerning the outer nasal region of macular thickness (276.70±17.64 µm in patients vs 282.44±9.64 µm in controls; p=0.043). Regarding choroidal thickness, patients with PD revealed significant thickening compared to healthy controls in the inner nasal region (250.78±99.50 µm in patients vs 205.28±81.62 µm in controls; p=0.014), outer nasal region (207.11±97.78 µm vs 163.39±70.02 µm; p=0.011), inner inferior region (252.25±96.54 µm vs 213.65±80.31 µm; p=0.032) and outer inferior region (233.00±89.10 µm vs 200.15±75.19 µm; p=0.049).
Conclusions PD patients present reduced retinal thickness and increased choroidal thickness in the macular area compared to healthy subjects detectable with new SS-OCT technology.

• F013

Analysis of the peripapillary retinal nerve fiber layer and choroidal thickness in patients with Parkinson´s disease using swept-source optical coherence tomography

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Purpose To analyze the thickness of several retinal layers and the thickness of the choroid in the peripapillary area in patients with Parkinson´s disease (PD) using swept-source optical coherence tomography (SS-OCT) as a marker for neurodegenerative injury
Methods 108 eyes of patients with PD and 90 eyes of healthy controls were included. All subjects underwent ophthalmologic evaluation, including retinal and choroidal assessment using SS-OCT Triton (Topcon), 3DH Wide protocol. RNFL-TSNIT data were analyzed in the peripapillary area, including retinal nerve fiber layer (RNFL), GCL+ layer (from RNFL to inner nuclear layer), GCL++ layer (from inner limiting membrane to inner nuclear layer) and choroidal thickness
Results Patients with PD revealed significant thinning in every retinal layer compared to healthy controls: average retinal thickness (280.25±20.18 µm in patients vs 288.18±13.09 µm in controls; p=0.013); inferotemporal sector of the RNFL thickness (135.08±25.28 µm vs 144.23±17.19 µm; p=0.024); superotemporal sector of the GCL+ layer thickness (38.52±7.02 µm vs 41.78±9.24 µm; p=0.047); inferotemporal sector of the GCL++ layer thickness (176.00±28.07 µm vs 187.07±16.93 µm; p=0.010). Contrary, patients with PD revealed significant thickening in total choroidal thickness compared to healthy controls (153.56±62.48 µm in patients vs 125.64±52.53 µm in controls; p=0.012), choroidal nasal (152.73±50.54 µm vs 129.32±54.86 µm; p=0.024), choroidal temporal (165.82±80.16 µm vs 128.40±50.81 µm; p=0.003) and choroidal inferior thickness (129.90±64.70 µm vs 98.83±51.67 µm; p=0.006)
Conclusions Patients with PD present significant reduction of peripapillary retinal, RNFL and ganglion cell layer thickness and significant thickening of the choroid in the peripapillary area detectable with new SS-OCT technology

• F014

Macular thickness and retinal layer measurements in multiple sclerosis patients using new Swetpt-Source Optical coherence tomography Triton device

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Purpose To evaluate macular thickness measurements changes in multiple sclerosis (MS) patients using Swept-source optical coherence tomography (SS-OCT)
Methods 101 healthy and 97 MS eyes were included in the study. All of them underwent evaluation of retinal measurements using DRI Triton 3DH wide scan SS-OCT. Nine macular ETDRS areas , average and central thickness, total macular volume and choroidal thickness were analysed. Comparisons between the two groups were performed using Student's T test
Results All retinal measurements in the ETDRS macular map showed significant reduction in MS patients. Average thickness (280.41µm in controls vs 266,96 µm in patients, p=0.010) and total macular volume (7,92 µm vs 7,54 µm; p=0.010). No significant reduction of the choroid layer thickness was found between patients and controls
Conclusions SS-OCT Triton is an efective method to detect retinal atrophy in MS patients. Further studies comparing Spectral domain and Swept source OCT are needed to demonstrate superior capability of SS-OCT technology to detect retinal changes

• F015

Retinal nerve fiber layer measurements in multiple sclerosis patients using new Swetpt-Source Optical coherence tomography Triton device

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Purpose To evaluate retinal nerve fiber layer (RNFL) thickness measurements changes in multiple sclerosis (MS) patients using Swept-source optical coherence tomography (SS-OCT)
Methods 101 healthy and 97 MS eyes were included. All of them underwent retinal evaluation using DRI Triton 3DH wide scan and retinal peripapillary thickness was analyzed: Total retinal thickness, CFNR, GCL+ (ganglion cells layer between CFNR and inner nuclear layer) and GCL++ (from the inner limiting membrane to inner nuclear layer) thickness were evaluated. Comparisons between the two groups were performed using Student's T test
Results GCL+ showed significant thinning in MS patients compared to controls, in temporal, nasal and superonasal sectors; GCL++ and RNFL thickness were significantly lower in the MS group in all the sectors except nasal; total retinal thickness was lower in MS patients in all sectors. (p <0.05)
Conclusions Peripapillary retinal structural alterations can be detected in MS patients using SS-OCT Triton. Further studies comparing Spectral domain and Swept source OCT are needed to demostrate superior capability of SS-OCT technology to detect retinal changes in these patients

• F016

Normative values for optical coherence tomography parameters in children and inter-examiner agreement of choroidal thickness measurements

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Purpose To determine normative values for central macular thickness (CMT), retinal nerve fiber layer thickness (RNFLT) and choroidal thickness (CT) in healthy children and to investigate their relationships with axial length (AL), central corneal thickness (CCT), refractive errors and intraocular pressure (IOP).
Methods A total of 120 eyes of 120 healthy children (72 girl, 48 boys, 11.95±2.26 years) underwent detailed ophthalmologic examination and optical coherence tomography (OCT) measurement (Spectralis OCT, Heidelberg Engineering, Heidelberg, Germany) in a cross-sectional study setting. CT was measured by two independent examiners in 3 separate points.
Results The mean global RNFLT was 98.75±9.45 (79.0-121.0) µm. The mean CMT was 232.29±29.37 (190.0-376.0) µm. The mean subfoveolar CT was 344.38±68.83 (148.0-572.0) µm measured by examiner 1 and 344.04±68.92 (141.0-573.0) µm measured by examiner 2. Inter-examiner agreement was %99.6 to 99.8 for CT in 3 separate points. The mean AL was 23.72±0.73 (22.14-25.56) mm. The mean IOP was 13.70±1.63 (11-19) mmHg. The mean spherical equivalent was -0.26±0.73 (-2.25 to +1.50) diopters. The mean CCT was 555.95±26.59 (498-614) µm. CMT was found to increase with AL (r=0.245, p=0.007). CT was demonstrated to increase with age (r=0.291, p=0.001) and decrease with AL (r=-0.191, p=0.037). Global RNFLT was found to decrease with AL (r=-0.247, p=0.007) and increase with CCT (r=0.208, p=0.022). Global RNFLT was positively correlated with CT (r=0.354, p<0.001).
Conclusions OCT parameters seem to show a wide range of variability in children. RNFLT, CMT and CT are either interrelated or correlated to age, CCT and AL. Furthermore, CT manual measurements with enhanced depth imaging OCT showed very high inter-examiner agreement. It should be borne in mind that normative values are unique in children when considering OCT results.

• F017

Early changes in mild Alzheimer's disease in the neuroretinal rim segmentation

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Purpose The purpose of the present study was to analyze in detail the peripapillary area divided into 12 sectors in order to identify the first sector that thins in Alzheimer's Disease (AD) patients compared with controls.
Methods A total of 23 mild AD patients and 28 controls were examined. Patients underwent a complete ophthalmologic exam. The peripapillary RNFL thickness parameters evaluated were thickness for each 12-o'clock hour position with the 3-o'clock position as nasal, 6-o'clock position as inferior, 9-o'clock position as temporal, and 12-o'clock position as superior. Patients were required to have a visual acuity better than 0.6 and no retinal pathology.
Results Compared to controls, the eyes of patients with mild-AD patients showed no statistical difference in peripapillary RNFL thickness ($p>0.05$); however, sectors 2, 3, 4, 8, 9, and 11 of the papilla showed thinning, but thickening in sectors 1, 5, 6, 7, and 10.
Conclusions Despite the fact that peripapillary RNFL thickness did not statistically differ in comparison to control eyes, the increase in peripapillary thickness in our mild-AD patients could correspond to an early neurodegeneration stage and may entail the existence of an inflammatory process that could lead to progressive peripapillary fiber damage.

• F018

Maculopapillary analysis in the posterior pole in patients with mild Alzheimer's disease

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Purpose To correlate the thickness of focal regions of the macula with those of the peripapillary nerve fiber layer using optical coherence tomography (OCT) in mild Alzheimer's disease (AD) patients and to compare them with age-matched controls.
Methods OCT of the macula and of the optic nerve from 19 mild AD patients and 25 control patients were included in the study. The thickness of 36 macular voxels of the 6x6 grid considered for analysis was correlated with the thickness of the 7 temporal papillary wedges across subjects. Each macular voxel was labeled with the peripapillary wedge with the highest correlation using a color-coded map.
Results In comparison with the controls, mild AD patients presented a significant: (i) thinning in the macular voxels 5, 6, 12, 15, 16, 18, 21, and 22 ($p < 0.05$) and; (ii) correlation between several macular voxels and some of the peripapillary wedges between groups ($p < 0.05$).
Conclusions There were significant differences in the maculopapillary correlation map pattern between mild AD patients and control group. The OCT changes detected could be ascribed to the inflammation and neurodegeneration that occur in the early stages of AD and could serve as a basis for future research aimed to develop a quick, easy, and non-invasive biomarker of AD.

• F019

Visual outcomes of fractionated radiotherapy in optic nerve sheath meningioma

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Purpose Optic nerve sheath meningioma (ONSM) is a rare benign tumor of the optic nerve sheath that can lead to blindness if untreated. We conducted a retrospective monocentric study to assess the effect of radiotherapy on tumor control and visual outcomes in patients with ONSM.
Methods All patients diagnosed with ONSM at our centre were reviewed and data on: symptoms at presentation; visual acuity (VA), color vision and visual fields (VF); treatment type; visual outcome if treated with radiotherapy were recorded.
Results There were 34 (26 female) patients reviewed. Presenting symptoms were decreasing vision (25 patients), subjective scotoma (4 patients), transient visual obscuration (4 patients), disturbance of color vision (1 patient), diplopia (4 patients), exophthalmia (3 patients), palpebral edema (2 patients), tearing (2 patients), conjunctival hyperaemia (2 patients), pain (8 patients) and headaches (3 patients). Median initial VA was 0.1 (interquartile range (IQR) 0 to1)logMAR, color vision was 1 (13 plates) and VF mean defect was 7dB. 16 patients were treated with fractionated radiotherapy (total 50.4Gy/28 sessions) between 2002 and 2015. After radiotherapy, VA improved in 13 eyes, was unchanged in 1 eye and decreased in 2 eyes. Median best-corrected VA improved from 0.1(IQR) (0 to 0.4)logMAR to 0 (-0.1 to 0)logMAR, color vision improved from 5 (0 to 12) to 12 (1 to 13), and median VF mean defect improved from 10 (5 to 19)dB to 4 (1 to 10)dB. Tumor size was reduced in 3 patients, and stable in 11 patients (not available in 2 patients). No adverse side-effects were reported during the time of follow-up.
Conclusions Fractionated radiotherapy is a safe procedure and can be used to treat patients with ONSM. In our study, visual improvement was observed in 13 (81%) eyes and visual loss in 2 (12.5%) eyes.

• F020

Clinical manifestations of parasellar mass

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Purpose This study was purposed to make comparative analysis on various clinical findings of parasellar mass which was diagnosed by ophthalmologist.
Methods For 51 patients diagnosed as parasellar mass (23 males, 28 females), we reviewed vision, clinical symptoms, visual fields, imaging study.
Results At the first visit, the patient's most common chief complain was decreased visual acuity or blurred vision (41 patients) and other symptoms include visual field defect (7 patients) and diplopia (3 patients). Corrected visual acuity was varied from 1.0 to less than 0.01. Variable visual field defect pattern was noted (normal to complete defect). But usually bilateral temporal hemianopia was the most common finding in visual field test. In some cases, diplopia was the only symptom of mass.
Conclusions When a patient complains visual field defects and shows unilateral or bilateral temporal visual field defect in visual field test, it was easy to suspect parasellar mass. But no visual field defect in patient with tumor is also exist. So in patients who complain unexplained visual discomfort with normal visual acuity or normal visual filed, we must suspect tumor and consider neurologic image study in order to rule out the tumor.

• F021

Papilledema secondary to internal jugular veins thrombosis in a peritoneal dialysis patient

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Purpose Intracranial hypertension secondary to internal jugular vein (IJV) thrombosis has been described in patients undergoing hemodialysis with peripheral hemodialysis shunts or repeated subclavian and jugular veins catheterizations. Pseudotumor cerebri, with no identified IJV thrombosis has also been reported in dialysis patients and has been associated with chronic or recurrent dialysis disequilibrium. We aim to report the case of a dialysis patient with papilledema secondary to bilateral IJV thrombosis.
Methods Case report with fundus photography, optical coherence tomography, perimetry, brain imaging with venography, cerebrospinal fluid (CSF) analysis and neck eco Doppler.
Results A 38-year-old man with end stage kidney disease undergoing peritoneal dialysis for 4 years presented with transient blurred vision, lasting a few minutes at a time, exacerbated by positional changes, with no vision loss or other symptoms. Physical examination revealed bilateral disc edema. No other ophthalmologic or neurological signs were found. Head CT with venography was unremarkable. Lumbar puncture CSF opening pressure was 23 cm H2O with normal CSF composition. Humphrey visual field were normal. Posterior neck eco Doppler showed absence of IJV bilaterally, which established the diagnosis.
Conclusions Papilledema secondary to IJV thrombosis may occur in dialysis patients as a result of hemodynamic factors related to arteriovenous fistulas or chest/neck veins catheterization and also in patients undergoing peritoneal dialysis. End stage kidney disease is associated with higher risk of cardiovascular events and IJV thrombosis must be promptly ruled out in patients presenting with altered vision and papilledema.

• F022

MonPack One and multiple sclerosis

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Purpose To asses visual function in patients with Multiple Sclerosis (MS) using the new device MonPack One visual stimulator (Metrovision, France).
Methods Forty eight eyes from relapsing-remiting MS patients and forty six eyes from controls were included. Disease duration, ophthalmic outbreaks and type of treatment were assessed. All patients underwent visual function evaluation using MonPack One visual stimulator. The protocol consisted of psychophysical tests (low contrast 10% ETDRS visual acuity -VA-, contrast sensitivity [1, 2, 5, 10, 20 cycles per degree], FAST 30 static visual field, and electrophysiological testing (pattern electroretinography-ERG-, multifocal reversal visual evoked potential -VEP-)
Results A statistically significant decrease was observed in the MS group compared with controls in low contrast 10% VA (0,08±0,27 vs 0,43±0,50, respectively), well-read number letters (39,70±5,58 vs 31,90±8,20), low (0.5 and 1cpd; $p<0.05$) and medium spatial frequencies (2 and 5 cpd; $p<0.05$) in contrast sensitivity, in all visual field parameters and central (1556,81±1120,97 vs 798,80±585,58 nV/deg^2) inferior nasal (798,50±390,14 vs 523,90±262,71) and inferior temporal (830,40±380,09 vs 677,55±730,19) sectors of the multifocal VEP. No differences were found in pattern ERG.
Conclusions MonPack One visual stimulator allowed the study of visual function in a controlled and protocolarized way. MonPack One detected low contrast visual acuity, contrast sensibility, visual field, and multifocal visual evoked potential alterations in patients with MS.

• F023

Wave-amplitude differences between corneal and conjunctival electrodes for multifocal electroretinogram

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Purpose To compare the wave amplitude of multifocal electroretinogram (mfERG) responses from DTL electrode located on the conjunctival fornix (fDTL) and ERG-jet contact lens electrode (CL).
Methods Thirty patients and 18 matched healthy volunteers were evaluated. Wave amplitude and level of discomfort with each electrode were compared in both patients and healthy volunteers. Comparisons among wave amplitudes were performed using Intraclass Correlation Coefficient
Results mfERG by corneal electrode provided the highest wave amplitude in both healthy subjects and patients ($p<0.005$), but it associated the highest discomfort ($p<0.001$) and the highest rate of dislocations. CL was able to differentiate patients from controls just in the ring 1 (central 2°) of the mfERG. By contrast, fDTL provided the lowest wave amplitude but better discriminated between patients and control group in ring 1 (central 2°) and 2 (2-5°) of the multifocal ERG. cDTL produced significant more artifacts in both groups ($p<0.001$).
Conclusions Although mfERG wave amplitude measurements were correlated, they cannot be directly compared, so it is mandatory to create an appropriate normative database with each electrode. Despite providing the lowest amplitudes, fDTL seems to offer the best features to perform mfERG regarding discomfort, number of artifacts and diagnostic capability.

• F024

Treatment of visual impairment in patients with Leber's Hereditary Optic Neuropathy (LHON) using Idebenone (Raxone®)

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Purpose LHON is an orphan mitochondrial disorder affecting the retinal ganglion cells leading to permanent blindness from which recovery is rare. More than 90% of patients harbor one of three mitochondrial DNA mutations in the genes coding of complex I of the respiratory chain. Idebenone, a short-chain benzoquinone, is a potent antioxidant and also interacts with the electron transport chain facilitating mitochondrial electron flux. Due to these properties idebenone (Raxone®) has been investigated for the treatment of LHON and we summarize the evidence available for efficacy based on a placebo controlled trial and from clinical practice.
Methods Visual acuity data from a randomized study (RHODOS), from case reports, retrospective cohort studies, an Expanded Access Program (EAP) and a natural history case report survey have been collected in a database of approximately 500 patients. The disease progression based on natural history data and from the Placebo treated patients are compared to the outcome for patients treated with idebenone with respect to the prevention of vision loss and the recovery of lost vision.
Results In RHODOS, the number of patients experiencing a clinically relevant recovery after 6 months of treatment was 10.3% in the Placebo group and 30.2% in the idebenone treated group. Patients in the EAP showed a recovery rate of 30.6% after 6 months of treatment increasing to 49.3% when comparing the final outcome after 15m (mean treatment) to the VA at nadir. The number of patients experiencing vision loss to above 1.0 logMAR VA was lower in RHODOS and in the EAP when compared to the datasets of untreated patients.
Conclusions A large body of evidence demonstrates that patients with LHON benefit from Raxone treatment and that the drug is well tolerated.

Conflict of interest
Any post or position you hold or held paid or unpaid?:
SH and GM are employees of Santhera Pharmaceuticals (Liestal, Switzerland). TK has been a principal investigator or investigator on industry-sponsored trials, has served on the scientific advisory board and has received speaker honoraria and travel costs (all from Santhera Pharmaceuticals). CC has received travel costs from Santhera Pharmaceuticals.

• F025

Clinical and radiological evidence of meningioma growth due to gestational or exogenous hormones: 2 cases

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Purpose We report 2 cases with documented hormonal growth of meningiomas, one probably caused by exogenous hormonal therapy, one by pregnancy-related hormonal changes.
Methods Observational report about 2 cases with either reproductive or exogenous hormonal growth of meningioma. Both patients underwent a full ophthalmological work up, including MRI-volumetry.
Results A 42 year-old man presented with unilateral blindness. Examination showed no light perception in the left eye. MRI of the brain revealed 11 meningiomas, with a large one compressing the optic nerve of the left eye. He had been treated for 23 years with cyproterone acetate (CPA) 100 mg/day to reduce his undesirable sexual behavior. CPA treatment was stopped immediately, resulting in a decrease of volume of the large meningioma of 250 cc.

A 33 year-old woman was referred because of blurred vision, migraine with hemiparesis and aphasia following a twin pregnancy. The left eye showed papillary oedema. The right eye was blind due to an unknown cause at the age of 7. MRI at that time was negative. She had just delivered twins after a 3rd pregnancy over only 2 years. MRI showed large meningiomas in the left optic canal. Since they were inoperable, a shunt to release intracranial pressure was placed. The papillary edema resolved and the volume of the meningiomas decreased.
Conclusions Two unrelated cases of hormone-induced growth of meningiomas are described. Hormone withdrawal results in a decrease of meningioma volumes. These findings illustrate the role of female sex hormones in the development and growth of meningiomas.

• F026

Pupillary reaction according to a balance autonomic nervous organ of vision in healthy children

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Purpose For the diagnosis and prevention of asthenopic complaints need to study pupillary reactions normal in response to light stimulus and the presentation of the object in the vicinity of somatically healthy persons without ophthalmic pathology taking into account the balance of the autonomic innervation.**The aim of** the work was to study the direct pupillary reaction to light stimulus.
Methods Pupillografiya was performed in 78 somatically healthy individuals (156 eyes) in the age of 5-9 years. 27 people prevailed balance the sympathetic autonomic nervous system, in 34 parasympathetic, 17 persons observed eutonic. The visual acuity, refraction static on autorefractometry Humphrey, Oftalmometres on Oftalmometres Zhavalya and ultrasound biometry of eyes have been studied. Provision of accommodation (RA) have been determined by the method Dashevskiy. The balance of the autonomic nervous system has been studied with the help of cardio-vascular index Cerdo.
Results All the healthy children, whose emmetropic refraction had been observed, had visual acuity for distance 1,0±0,02 in the both eyes. The pupil reaction with the sympathetic innervation before the light stimulus by direct reaction was OD 63,65±2,61mm2, OS 66,92 ± 2,27mm2. The eutonic reaction was OD 34,99±1,18mm2, OS 31,77±1,42 mm2. The reaction with the parasympathetic innervation was OD 28,93±0,94mm2, OS 25,72±1,08mm2. After the presentation of the light the reaction with the prevalence of sympathetic innervation was OD 15,77±1,09mm2, OS 15,87±1,30mm2. The eutonic pupillary area was OD 10,73±1,13mm2, OS 8,74±0,60mm2, while the pupillary area with a predominance of parasympathetic innervation was OD 8,63±0,74mm2, OS 7,19±0,54mm2.
Conclusions The connection between types of autoinnervation interrelationship must be studied for the diagnostic and intreatment of asthenopia.

• F027

Paraneoplastic retinopathy and optic neuropathy with Waldenström Macroglobulinemia

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Purpose To report the clinical, electrophysiologic and immunopathololgic findings in a patient with progressive visual loss due to retinal and optic nerve degeneration associated with a Waldenström's macroglobulinemia (WM).
Methods A 77-year old man with mild stage WM, complained of progressive bilateral visual loss, with photopsia, intense photophobia and loss of color perception. Patient developed severe legs pain and unsteadiness.
Complete ophthalmological, neurological and hematological examinations were realized, and patient followed over a period of 2 years. Immunohistochemical studies to determine the presence of serum antiretinal antibodies were performed.
Results Visual acuity was gradually reduced to 1/10 RE and 2/10 LE, with a severe loss of color perception. The visual field showed a deep central and peripheral visual loss in both eyes. Optic nerves were pale and excavated, macular remained normal as peripheral retina. Cerebral CT scan did not show anomalies in the brain as in the optic nerves, lumbar puncture was unremarkable. Neurological revealed a rest less leg syndrome. Electroretinogram showed a reduce rod response and a delayed combined and cone response. Hematologic evaluations confirmed the WM and immunohistochemistry showed reactivity of the patient's serum against the photoreceptors.
The patient was treated with 4 intravenous infusions of Rituximab, followed 1 month later by 1gr of Methylprednisolone for 3 days. Improvement of central vision (4/10 RE, 6/10 LE) and peripheral visual fields was reported.
Conclusions The visual loss in this patient is due to a combined dysfunction in the retina and the optic nerve and presumed to result from antibodies IgM-subtype reacting to proteins in different retinal antigens.

• F028

Eye position under general anesthesia in orthophoric children

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Purpose The aim of this study is to evaluate the effect of general anesthesia with muscle relaxant on the horizontal ocular deviation in orthophoric children.
Methods Children aged 4 to 16 years requiring a non-ophthalmological surgical procedure under general anesthesia with neuromuscular blockade were included. Prior ophthalmological examination excluded any oculomotor disorder. Horizontal ocular deviation was measured by the Hirschberg photographic method by comparing pictures taken in the awakened state to those taken under general anesthesia. Monitoring of anesthesia was performed by the Bispectral index (BIS) and muscle relaxation by the train of four (TOF).
Results 33 Patients were included. Mean age was 8(+/-4) years and 67.7% were male. The mean horizontal ocular deviation after general anesthesia with neuromuscular blockade was -0.2 diopters (SD 9.7). Median was -0.7 diopters. **72.7% of patients** had an ocular deviation of **less than 7.5 diopters** with a normal distribution.
Conclusions Our results show that contrary to popular belief, eye position under general anesthesia in children without strabismus **is not divergent but very close to orthophoria.**

• F029

Learning curves for strabismus surgery in two ophthalmologists

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Purpose To identify the average turning point by comparing the learning curves of two surgeons learningto perform strabismus surgery.
Methods Patients who underwent procedures to correctexotropia between January 2010 and December 2014 followed for at least 3 months were retrospectivelyassessed. The first 70 patients on whom each of two ophthalmologists (A and B) performed surgery to treatstrabismus were divided into 7 cohorts comprising 10 patients each based on the chronological order ofthe surgery. Factors, including patient age, preoperative angle of deviation, operative time, and success orfailure of the operation, were compared between the two surgeons. Learning curves were calculated basedon changes in operative time and operation success rate. Operation success was determined by measuringthe angle of deviation at a distance of 5 m 3 months after the operation.
Results A turning point wasobserved after 40 cases for Surgeon A and 50 cases for Surgeon B based on the operative time learning curve.No turning point was observed in the operation success rate learning curve based on the absence of a specifictrend. Success rate by cohort was not significantly different between the two surgeons ($P > 0.05$). SurgeonB had a significantly longer mean operative time than Surgeon A ($P = 0.045$).
Conclusions Approximately50 cases are required for an ophthalmologist to reach a turning point in strabismus surgery. This outcomecan be used as a guideline when training surgeons to perform strabismus surgery.

• F030

Surgical Effect of Medial Rectus Posterior pulley fixation in Esotropia greater at near fixation

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Purpose To determine the surgical effect of medial rectus posterior pulley fixation in esotropia greater at near fixation.
Methods Medical records of consecutive patients who underwent medial rectus posterior pulley fixation for esotropia greater at near fixation and followed up at least 1 year were reviewed retrospectively. Surgical success was defined as orthotropic or ≤8 prism diopters(PD) esotropia at distance at 1 year after surgery. Preoperative and postoperative deviation, distance-near disparity and the sensory status were evaluated. Stereoacuity was measured with Titmus test and normal stereoacuity was defined as ≤ 100 arc sec at one year after surgery.
Results Sixteen patients were included the study. The mean age at surgery was 6.29 ± 2.17 years (range 3.00-9.92) and mean follow up period was 18.8 ± 4.79 months (range 12.00-27.00). Preoperative angle of deviation was 23.31 ± 12.37 PD at distance, 33.81 ± 10.95 PD at near and distance-near disparity was 10.50 ± 4.77 PD. Twelve patients underwent bilateral medial rectus recession and 4 underwent unilateral medial rectus recession. Fourteen (85.8%) patients achieved surgical success and 2(14.2%) patients were undercorrected. The mean distance-near discrepancy was 5.81 ± 4.48 PD at 1 year after surgery, which was significantly decreased ($p=0.018$, Wilcoxon signed ranked test). Normal stereoacuity at near fixation was achieved in 10 (32.5%) patients at 1 year after surgery.
Conclusions Medial rectus posterior pulley fixation may be the effective method in esotropia greater at near fixation.

• F031

Strabismus in Children with Periventricular leukomalacia: MRI correlation

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Purpose To investigate the correlation between strabismus and the severity of PVL based on magnetic resonance imaging (MRI) findings. Although strabismus is commonly associated with periventricular leukomalacia (PVL), its clinical features are not well established.
Methods In this cross-sectional study, 73 consecutive patients who visited the Department of Ophthalmology and were diagnosed with PVL were included. The severity of PVL was graded based on the MRI findings of the patients. All of the patients underwent complete ophthalmic examination, and strabismus was characterized in terms of direction, constancy, and angle of deviation. The prevalence and the characteristics of strabismus and their correlation with the grade of PVL were investigated.
Results The perinatal characteristics did not differ between different grades of PVL. Refractive errors, found in 56 (76.7%) patients, did not differ between the grades of PVL either. Strabismus was observed in 38 (52.1%) patients, and its prevalence increased with the grade of the disorder; 20 patients had exotropia and 18 had esotropia. Constant strabismus was found more frequently in patients with higher grade PVL. However, the direction and angle of deviation did not differ depending on the grade of PVL.
Conclusions The prevalence of strabismus was higher among patients with PVL than among healthy individuals and increased with the severity of PVL. The severity of PVL might be related to the presence and constancy of strabismus. Early ophthalmic evaluation is necessary in children with PVL, especially in those with higher grades of the disease.

• F032

Normal Range of Eye Movement and Its Relationship to Age

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Purpose To determine the range of eye movement in normal human subjects and to investigate the effect of age on eye movement.
Methods We enrolled 261 healthy subjects, 5 to 91 years of age for this prospective observational study. Photographs were obtained in the cardinal gaze positions and processed using Photoshop. The processed images were analyzed using the Image J program to measure the angle of eye movement. The angle of eye movement was quantified using a modified limbus test. We measured the angle of eye movement in adduction, abduction, elevation, and depression.
Results The normal ranges of eye movement were 44.9±7.2° in adduction, 44.2±6.8° in adduction, 27.9±7.6° in elevation, and 47.1±8.0° in depression. There were significant negative correlations between the angles of horizontal and upward gazes and age ($R=-0.294$ in adduction, $R=-0.355$ in abduction, and $R=-0.506$ in elevation, all $P<0.001$). However, the angle of downward gaze was not significantly correlated with age ($R=0.017$, $P=0.722$).
Conclusions The normal ranges for the angle of horizontal gaze were symmetric, whereas the range of upward gaze angle was smaller than that for the downward gaze among all ages. Unlike the age-related decline of range in other gazes, only downward gaze was not impaired by increasing age. Differences in eye-movement range based on gaze direction and their associated aging mechanisms should be considered when assessing eye movements.

• F033

Surgical treatment of pediatric strabismus (PS): series of 148 patients

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Purpose Surgical management of Pediatric Strabismus (PS) is a frequent reason of consultation in current ophthalmic practice. The aim of this study is to describe the PS epidemiology in patients consulting for surgery.
Methods This 3 years observational descriptive retrospective study was led in ophthalmological department of university hospital. 148 patients less than 18 years were included. All patients received complete ophthalmological and orthoptic evaluations to determine the clinical form of strabismus.
Results The sex ratio was: 49.3% females versus 50.7% of males. Exotropia was found in 46.4% of females and 53.4% of males. Esotropia was the predominant etiology (79.6%), then 19% of exotropia and 1.4% of vertical deviation. Mean age at first consultation was 6.6 y (6.3 for esotropia versus 9.3 for exotropia). 36% had infantile forms, 26% had accommodative strabismus, 13% had an exotropia, 7% had an acquired esotropia. For amblyopia we found only 3% of severe forms whereas moderate and low forms were found in 7.4% and 11.8% of patients. Risk factors of PS identified were neurological diseases (8.1%), hyperopia (+2.33 diopters in average), complicated pregnancy (16.3%) or delivery (27%), prematurity (13 .4%), birth weight lower than 2.5Kg (14.6%) and pedigree of strabismus (74.1%).
Conclusions The epidemiology of PS in our study is related to other European studies but different from American or Asian studies. The hypothesis are possible ethnic differences and different therapeutic management. Better understanding of these risks factors will enhance the prevention and treatment of this pathology.

• F034

Long term results of concomitant strabismus treatment based on operation preliminary modeling using three-dimensional biomechanical eye model

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Purpose To analyze long term surgical treatment results of concomitant strabismus (CS) patients based on operation preliminary modeling in three-dimensional biomechanical eye model (TBEM).
Methods There were analyzed surgical treatment results in 106 patients with CS, which were operated on after the operation was preliminary modeled at TBEM "SEE-KID".
Results Orthotropy was obtained in 54/106 patients (50,9%) at the first day postoperatively. 52/106 patients (49,1%) had residual angle of 5-10° – hypocorrection was in 44 patients, and hypercorrection was in 8 patients. 18 patients were lost to follow-up. At 6-12 months follow-ups ortothropy has been preserved in 53/88 patients (60,2%), and in 35/88 patients residual angle of 5-10° remained – hypocorrection was in 31 patient, and hypercorrection was in 4 patients.
Conclusions TBEM use in complex examination and treatment of CS patients allows predicting surgery result in some cases and accelerates diagnostic process, but the method needs further investigation. Particularly, extraocular muscles biomechanics needs to be more precisely estimated (degree of the muscle hyper- or hypofunction, movement amplitude).

• F035

Accommodation and fusion in patients with constant and intermittent exotropia

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Purpose To determine the characteristics of the accommodation and fusion in patients with constant and intermittent divergent strabismus
Methods Under observation there were 59 patients: 33 with a constant form of strabismus (I) and 26 with intermittent form (II) aged 10 -21 y.o. with visual acuity with correction (0,8 ± 0,3) and refraction (0,5 ± 2,8) dptr, the angle of deviation in group I was for distance (36,6 ± 2,8) dptr, and for near (16,6 ± 2,5) dptr; in the II group (26,6 ± 2,8 and 12,0± 2,3) dptr respectively, p >0.05. The nearest point of convergence was determined by proximeter, the AK/A ratio by heterophory method and the fusion was assessed using synoptophore, distance and near deviations were assessed using prism cover test.
Results Data analysis showed that the nearest point of convergence did not differ significantly in patients of both groups (8,8 ± 0,9) cm and (8,6 ± 0,6) cm, respectively). Values of AK/A also did not differ significantly (-0,5 ± 2.5) and (1,02 ± 0,97), in the I and II group respectively, but values less than 0 were found in 53,5% of cases at the I and in 38% at the II. Fusion by synoptophore was significantly more frequently in patients of the II group – 53,8%, in comparison with the I – 24,4%, ($\chi 2 = 6,2$), p=0,001.
Conclusions It is noted that in cases with the permanent form of strabismus low values of AK/A are more common (53,5%) than in intermittent (38%), which may be associated with weakness of accommodative convergence in these patients. Found that the fusion exist significantly more common in patients with intermittent form of divergent strabismus (53,8%) in comparison with a constant (24,4%), $\chi 2 = 6,2$,p=0,001

• F036

Early childhood blindness – etiologies and comorbidity

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Purpose To identify etiologies and developmental comorbidity in children with congenital or very early blindness.
Methods Children with congenital or early blindness in Sweden during a 20 year period were identified through registers. Major causes for the blindness and developmental disturbance were collected from patient records.
Results Four causes of blindness amounted to 65% of all etiologies: retinopathy of prematurity, optic nerve hypoplasia, Leber congenital amaurosis, and optic nerve atrophy, in falling order of frequency. Nearly three out of four children had at least one additional impairment besides blindness; the most common being intellectual disability and autism spectrum disorder. More than half of the population had more than one additional impairment.
Conclusions Blindness in itself entails considerable implications for a child's development and learning. When blindness is combined with other developmental disorders, there is a significant need for support and adaptation. It is important to understand the developmental effects of both the blindness and other coexisting disabilities in order to correctly interpret the behavior and needs of the children.

• F037

Symmetric tarsal show is crucial in creating upper eyelid symmetry

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Purpose To illustrate different causes of upper eyelid asymmetry and to stress that detection of any asymmetry is important in avoiding an unhappy patient.
Methods Patients want an "upper eyelid correction" and do not know the real cause of the asymmetry, or even did not notice any asymmetry. Different kind of asymmetric appearances of the upper eyelids will be shown and analyzed.
Results The upper eyelid has several landmarks. Besides the palpebral aperture, the margin pupil distance and lid crease height, also the margin fold distance/tarsal show, the lid fullness and braw distance needs to be described. An asymmetric tarsal show is often perceived as ptosis. Also bony orbit, eye position, orbital fat and braw position are all important factors influencing the final upper eyelid shape. In some conditions a perfect upper eyelid symmetry is very difficult to achieve or sometimes impossible.
Conclusions Good preoperative assessment is crucial in eyelid surgery, both in primary surgery and in correcting postoperative asymmetry. Good patient counseling is important to create realistic expectations.

• F038

Orbital cellulitis in a child with sickle cell anemia

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Purpose Orbital cellulitis and preseptal cellulitis are the major infections of the ocular adnexal and orbital tissues. Orbital cellulitis is an infection of the soft tissues of the orbit, posterior to the orbital septum.The purpose of this text is to point out sickle-cell disease as an important risk factor in a two-year-old boy with sinusitis.
Methods We evaluated a two-year-old boy with sickle-cell disease and sinusitis treated with oral amoxicillin (80 mg/kg/day). He presented a remarkable proptosis, intense ophthalmoplegia and conjunctival chemosis, with a temperature of 39ºC and leukocytosis with left shift. We treated him with clindamycin 30 mg/kg, cefotaxime 200 mg/kg and prednisolone IV.
Results Axial image CT scan demonstrated sinusitis of the left ethmoid sinus. Furthermore, there was a left sided subperiosteal abscess between the medial wall of the left orbit and the left medial rectus muscle. Due to the bad evolution and the CT scan image, the sinus was drainage in a surgical procedure under general anesthesia. Appropriate patient evolution was achieved without the need for additional therapy.
Conclusions Patients with sickle-cell anemia show anincreased risk of severe bacterial infections due to loss of functioning spleen tissue. Daily penicillin prophylaxis is the most commonly used treatment during childhood.Orbital cellulitis can result in orbital and intracranial complications. Blindness may occur secondary to elevated intraorbital pressure. This is the reason we must control the patient at least daily and evaluate the antibiogram. Finally, when medical treatment is not working and there is an elevated intraorbital pressure with involvement of the eyeball, the surgery cannot be postponed.

• F039

ROP laser treatment based on fluorescein angiography classification

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Purpose To report laser treatment of babies with retinopathy of prematurity (ROP) based on diagnostic signs in the fluorescein angiography images (FA). FA reliability and accuracy were previously demonstrated [EJ opht 23(6):881-886 2013
Methods This is a cross-sectional study with retrospective diagnostic data from 72 eyes of 36 premature infants (average gestational age: 26 weeks; average birth weight: 742g) with Type 1 ROP stage 2 evaluated by RetCam3 and FA. RetCam funduscopic images were compared with FA images. A grid with ocular fundus divided into 3 concentric zones (ICROP 1984-87) and into 4 quadrants centered on optic nerve was superimposed on 360° retina photomontages (Photoshop) obtained from the RetCam and FA images. The FA diagnostic signs included leakage, ischemic areas, peripheral plus disease and vascular anomalies. These signs were not detectable in the RetCam images of the same patients. A scoring system was derived considering the presence (1) or absence (0) of the diagnostic signs. The scores of each single sign were summed to obtain a total score for each quadrant. These scores were then summed to get the global score of each eye. Three different fluorangiographic categories were defined in ROP stage 2 (fundoscopic image): mild (score<4), medium (4≤score≤10) and severe (score>10).The decision of either laser-treatment or observation was made based on this FA classification.
Results 58 eyes were classified as severe stage 2, 22 as medium and 14 as mild. Complete (360°) and partial (90° or 180°) laser-treatments were performed in severe and medium ROP, respectively; for mild ROP closely observation was preferred.
Conclusions FA classification is a useful tool to detect early signs of ROP progression to threshold disease. It improves treatment timing and extension in order to obtain the best anatomical and functional outcomes.

• F040

Normative values of retinal vessel oximetry in healthy children against adults

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Purpose Retinal oximetry (RO) has been established as a non-invasive method to analyze oxygen saturation in retinal vessels. The aim of our study was to compare metabolic (oxygen saturation) and anatomical (retinal vessel diameter) RO parameters of healthy children against adults.
Methods A total of 157 eyes of 79 healthy subjects were examined: 20 eyes of children (7-18y) were compared to adults of different age groups (20-29y [n=16]; 30-39y [n=46]; 40-49y [n=38]; 50-59y [n=25], 60-87y [n=12]). RO was performed with the oxygen saturation measurement tool of the Retinal Vessel Analyser (RVA; IMEDOS Systems UG, Jena, Germany). The oxygen saturation in all four major peripapillary retinal arterioles (A-SO2) and venules (V-SO2) were measured and their difference (A-V SO2) was calculated. In addition, we evaluated the corresponding diameter in retinal arterioles (D-A) and venules (D-V). For statistical evaluation non-parametric tests (Friedman test for multiple comparisons, paired Wilcoxon rank sum test for pairwise comparisons) were performed.
Results Children showed statistically significant lower arterial oxygen saturation values (A-SO2) compared to all adult subgroups (Friedman test, p=0.0005). Although not statistically significant, the values of V-SO2 (p=0.06) and A-V SO2 (p=0.30) showed a trend to be lower in children. The D-A (p=0.49) and D-V (p=0.82) values were not significantly different between groups.
Conclusions These data indicate that the retinal oxygen metabolism changes throughout lifetime. Therefore, normative data for different age groups are mandatory.

• F041

Evaluation of monotherapy of intravitreal Bevacizumab in retinopathy of prematurity stage 3 plus

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Purpose Evaluation of monotherapy of Bevacizumab intravitreal effect in Retinopathy Of Prematurity stage 3 plus treatment
Methods 158 eyes of 89 premature infants with threshold ROP 3 plus disease which 86(51.2%) in zone I and 82(48.8%) in zone II , were treated with intravitreal injection of 0.625mg in 0.025 cc bevacizumab that 11eyes (7%) were treated with second injection. No prior laser or other intravitreal therapy was done. Fundus examination was performed prior to the intervention and at each follow-up visit. Changes in various mean vital parameters one week post intervention compared to pre-intervention were assessed.
Results Any infant wasn't any problem post intravitreal bevacizumab injection. After 4 to 161 days(mean 17.62), all eyes showed complete traet the puls disease and after 4 to 278 days (mean:44.39) all eyes showed complete retinal vascularisation without any signs of disease recurrence
Conclusions Treatment of ROP stage III puls disease with intravitreal Bevacizumab was effective in all cases and should be considered for treatment. Any side effect of Bevacizumab was seen. More patients with longer follow-up duration are mandatory to confirm the safety and efficacy of this treatment

• F042

Phakic intraocular lens (Verisyse) implantation for correction of high anisometropia in pediatric patients

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Purpose Our study evaluated safety and efficacy of Verisyse™ (AMO) phakic anterior chamber intraocular lens (IOL) in the correction of significant myopic (>-9 D) or hyperopic anisometropia (> +6D) in children who are noncompliant to conventional treatment with spectacle correction or contact lenses.
Methods 28 children with myopic anisometropia (range –9,0 to –18,0 D, SE) and 7 patients with hyperopic anisometropia (range +6,0 to +9,5 D, SE) underwent unilateral Verisyse phakic IOL implantation under general anesthesia. All patients had chronic difficulties with spectacles due to aniseikonia or with contact lens intolerance. Pre- and post-operative visual acuity, cycloplegic refraction, anterior and posterior segment examination, axial biometry measurements, endothelial cell counts, stereoacuity and aniseikonia examinations were performed in all patients. Target refraction was approximately 0 to -1 D. The mean age was 6,7 years; range 5-14 years. Mean follow-up was 19.5 months (range, 10-36 months).
Results *The mean spherical equivalent cyloplegic refraction of myopic eyes changed from –15,2 D pre*operatively to –0,73 D postoperatively.
The mean hyperopia reduced from +7,65 D preop. to +0,94. 81% of treated eyes were in the range ± 1,0 D of emetropia. The mean uncorrected visual acuity improved from 0,012 to 0,35 (logMAR 0,45± 0,22), t-test; P=0,0014. The mean best spectacles corrected visual acuity (BSCVA) changed from 0,23 (logMAR 0,58±0,15) to 0,62 (log MAR 0,17± 0,13), t-test; P=0,0238. The mean Safety Index (BSCVA postop/preop) was 2,18. Improvement in stereoacuity was reached in all 35 patients.
Conclusions Anterior chamber phakic IOLs may provide a safe and effective alternative in management of highly anisometropic myopic and hyperopic children, who are noncompliant with conventional treatment with spectacles or contact lenses.

• F043

Excimer laser correction for myopic anisometropic amblyopia in pediatric patients- Long term results

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Purpose To evaluate the efficacy, predictabilty, safety, stability, visual acuity and binocular vision results of laser-assisted subepithelial keratectomy (LASEK) for the correction of high myopic anisometropia and amblyopia in children.
Methods Our study comprised 195 eyes of 195 pediatric patients that had LASEK for high myopic anisometropia from -5.5 to -11.5 D operated between 1998-2012. All children were unable to use spectacles due to aniseikonia, and they were noncompliant with contact lenses. They were at 3 to 8 years of age in time of surgery, Children younger than 7 years were operated in general anesthesia. All patients were treated with LASEK multizonal ablation technique. In all children surgery was followed by a half-day patching of the dominant eye. Main outcome measures were cycloplegic refraction, uncorrected and best spectacle-corrected visual acuity (UCVA, BSCVA resp.), keratometry, biometry, ocular alignment, corneal clarity and grade of stereopsis over 2 to 12 years of follow-up.
Results The preoperative mean spherical equivalent (MSE) was -8.32 D. The postoperative MSE was –1.21D at the last visit. The mean preop UCVA 0.033 increased to 0.59 (P<0.05) postop. The mean preop. BSCVA was 0.38 and changed to 0.89 postop. The safety index was 1.79. All the eyes had no line lost in BSCVA, 60 eyes had two lines gained, 56 and 79 eyes had 3 and 4 or more lines gained, resp. Preoperative spectacle aniseikonia decreased from 11,6% to 2,1% postop.Binocular vision was improved and saved in 86% of children. No postoperative complications were observed.
Conclusions Pediatric LASEK was highly effective and safe methods to reduce myopic anisometropia up to –12D, decrease spectacle aniseikoina, improve visual acuity and stereopsis in children aged 3 to 8 years with amblyopia when contact lens intolerance

• F044

Comparaison of the Plusoptix A12 and the 2WIN with the Retinomax K-plus 3 in a pediatric population

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Purpose To compare non-cycloplegic refractive results obtained with the Plusoptix A12 (Plusoptix, Germany) and the 2WIN (Adaptica, Italia), to Retinomax K-Plus 3 (Righton, Virginia) in a pediatric cohort.
Methods 106 eyes of 53 childrens were included prospectively between March 2015 and June 2015. On each eye, no-cycloplegic refraction was performed with the Plusoptix A12 and the 2WIN, and cycloplegic refraction was performed with the Retinomax K-Plus 3, which was used as gold-standard reference method. All data from each device, concerning sphere and cylinder power and axis, were compared to cycloplegic refractive measurements. The measures were considered reliable when the difference on sphere or cylinder power was between -0,5 D and +0,5 D, and when the difference on axis was less than 10°.
Results The mean age was 7,3 years (range, 1 to 17 years). Regarding sphere, measures were reliable in 37,7% for the right eye and 35,8% for the left eye with the Plusoptix A12 and in 35,8% with the 2WIN, regardless the eye. The sphere was underestimated respectively in 59,3% and 57,5%. Regarding the cylinder power, measures were adequate in 66% for the right eye and 69,8% for the left eye with the Plusoptix A12 and in 79,2% for the right eye and 64,2% for the left eye with the 2WIN. Concerning the cylinder axis, values were reliable in 32% for the right eye and 47% for the left eye with Plusoptix A12 and 42% for the right eye and 62% for the left eye with the 2WIN .
Conclusions The Plusoptix A12 and the 2WIN seem reliable for the evaluation of the cylinder power but not for the axis. These devices trend to underestimate the sphere. These devices can be used for screening of children refractive errors, but can not restitute cyloplegic retinoscopy measurements for prescription of optical corrections.

• F045

Rupture of Descemet's membrane associated with forceps delivery

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Purpose In modern medicine forceps-induced birth trauma to the eye is a rare clinical event. Forceps injury to the cornea occurs during complicated forceps delivery. The break in Descemet's membrane is the most common complication.
Methods Interventional case report showing the rupture of Descemet's membrane due to a complicated forceps delivery.
Results A 2 days-old boy was referred for severe and diffuse corneal edema. Medical history was significant for forceps delivery. On examination, he was found to have a rupture of the Descemet's membrane. Conservative treatment and application of hypersomolar solution was decided. Corneal edema was resolved in three months. Actually the cornea remained clear but persists a residual corneal astigmatism of 6D.
Conclusions The application of the forceps can cause accidental rupture of the cornea at the level of the Descemet's membrane. The edema resolves spontaneously within a few weeks or months eventually leaving the visible edges of the break and a clear cornea. Rupture of Descemet's membrane is not presented as an Ophtalmologic urgency but it´s crucial to follow these patients because failure to intervene leads to amblyopia or 'lazy eye.'

• F046

Congenital aniridia : an epidemiological approach on 105 patients

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Purpose Aniridia is a rare ocular disorder affecting beside iris, cornea, angle structures, lens and fovea, and possibly associated with other anomalies. This study aims at understanding features of patients with congenital aniridia, identifying the characteristics phenotypes of the disease and its associated anomalies.
Methods Patients affected by congenital aniridia were prospectively included and clinically examined at two french pediatric reference centers, with local ethics committee approval. Following parameters were assessed: sex ratio, sporadic or familial history, associated eye anomalies (glaucoma, limbal deficiency, cataract).
Results The study included 105 patients of the 135 registered at Ophtara Rare Disease Center with CEMARA data basis. The median age at last examination were 10 years old [3 days ; 75 years] with a 65% rate and a mild female predominance (sex ratio 0.65). All patients had bilateral aniridia, with a remaining iris insertion uni or bilateral in 32 patients (30,5%). Thirty patients had a familial form of aniridia (28,6%). Aniridia was isolated in 94 p. (89,5%), and associated with 7 WAGR syndromes, one WAGRO syndrome, one Gillespie syndrome. Cataract was described in 51 patients (49%) - bi (41%) or unilateral (8%) -, limbal deficiency in 59 p. (56,2%), and glaucoma in 45 p. (42,9%). A mutation of the PAX6 gene was registered in 23 p. (21,9%), with no obvious genotype-phenotype correlation. In absence of iris insertion, the relative risk of glaucoma was assessed at 1.6 (IC 95% [1,03 ; 2,58]).
Conclusions The aniridia phenotype characteristics varies widely. Risk factors for glaucoma/limbal insufficiency have to be better defined by further studies and a standardization of the flow charts clinical elements to collect should provide better insight in further congenital aniridia data collection.

• F047

Does macular pigment optical density really matter in children?

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Purpose To evaluate macular pigment optical density (MPOD) in healthy children and to compare with strabismic children.
Methods The study included 54 healthy children and 41 children with strabismus. All underwent ophthalmological evaluation, macular pigment optical density measurement (Macular Densitometer, Macular Metrics II, Rehoboth, MA, USA) and questionnaire about food habits. Children with strabismus were graded in terms of fixation preference. Gestational age, birth weight and body mass index of the participants were matched.
Results The mean age was 9.87±2.39 years in healthy children and 9.07±2.07 years in children with strabismus ($p>0.05$). Mean MPOD was 0.23±0.25 in healthy eyes and 0.25±0.27 in non-preferred eyes of strabismic children ($p>0.05$). MPOD was significantly higher in preferred eyes of strabismic children (0.43±0.34, $p=0.001$). There was a significant difference of MPOD between both eyes in patients with different grades of fixation as patients with grade 1, 2, 3 preference had interocular difference of MPOD whereas patients with grade 4 preference (free alternation) had similar MPOD in both eyes ($p=0.008$). No relation between MPOD and age, food habits, gestational age, birth weight and body mass index was demonstrated. Furthermore, interocular visual acuity difference, type of strabismus and angle of deviation were found to have no effect on MPOD.
Conclusions Preferred eyes of children with strabismus seem to have higher MPOD compared to non-preferred eyes. This difference may emerge from the higher tendency of pushing the button while preferred eye is under testing. Similar MPOD in healthy and non-preferred eyes remain unexplained and deserve further investigation. This result should been enlightened and it should be kept in mind that MPOD measurement require good cooperation and its results should be carefully interpreted.

• F048

Unexplained vision loss with intra-ocular silicone oil tamponade in situ; a case series

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Purpose Silicone oil provides a long-lasting retinal tamponade which is of particular benefit when attempting to repair complex retinal detachments associated with proliferative retinopathy and giant retinal tears. There have been reports of sudden unexplained visual loss secondary to the use of silicone oil tamponade, often after removal of silicone oil, which is typically severe and permanent. We report a case series of patients who lost vision with silicone oil tamponade in situ.
Methods Observational report and analysis of three cases of unexplained vision loss with silicone oil tamponade in situ for retinal detachment surgery.
Results Three cases of unexplained vision loss with silicon oil tamponade were analysed. Two were male and the average age was 55 (51-62 years). 2 cases were macular on retinal detachments. 3 months post operatively, visual acuity was 6/9 in two cases and 6/12 in the third case with silicone oil in situ. Silicone oil 2000cs was used in all cases and the primary success rate was 100%.
All had normal intra ocular pressure, fundal examination and optical coherence tomography at 3 months. Loss of vision occurred at 5 months post-surgery with silicone oil in situ in all three cases. Visual acuities dropped to 6/60, 6/36 and 6/36 respectively. Silicone oil was removed in all cases and visual acuities were 6/36, 6/60 and 2/60 at 1 year following silicon oil removal. Electro-diagnostic tests confirmed reduced macular function in the affected eyes.
Conclusions Unexplained vision loss secondary to silicone oil tamponade is severe and permanent.
The etiology is still unknown and further work is required to identify the incidence and potential risk factors for this devastating phenomena. A better understanding of this condition would enable us to manage these cases more appropriately and reduce the likelihood of it occurring.

• F049

Macular hole angle as a surgery prognostic factor

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Purpose To analyze pre-surgical macular hole (MH) angle measured by spectral domain optical coherence tomography (SD-OCT) and its influence on anatomical and visual outcomes of macular hole surgery
Methods A retrospective observational study of 37 eyes, with idiopathic MH, of 37 patients was conducted between 2013 January 1st and 2014 December 31st. Temporal and nasal angles of the macular holes were measured as the angle between RPE and the retinal edge. Angles were measured using a protractor directly on the screen of the SD-OCT machine. For statistical analysis, the approximate average angle of the macular hole was estimated through the average between the temporal and nasal angle of each eye. Besides medium MH angle, other parameters were considered, including minimum hole diameter; hole base diameter; hole height and presence of cystic edges. Several MH indices, such as Macular Hole Index, Tractional Hole Index and Diameter Hole Index, were calculated. Separate multivariate regressions for the dependent variables final best corrected visual acuity and anatomical closure were performed to analyze their associations with SD-OCT parameters as independent variables.
Results Results: Median average angle was 43.5 (35.0-45.5) degrees. Multivariate analysis showed that average angle did not significantly correlated to anatomical closure and final visual acuity, in contrast to hole base diameter and hole height that significantly correlated to final visual acuity.
Conclusions Our study demonstrates that MH angle did not correlate to anatomical or visual outcome after MH repair surgery.

• F050

Novel clinical method for preventing condensation in noncontact wide-angle viewing systems

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Purpose To compare the effects of a soaking objective lens into warm saline and a corneal coating with ophthalmicviscoelastic devices (OVDs) for preventing condensation during vitrectomy with noncontact wide-angle viewingsystems (WAVs).
Methods Four experiments were performed with a noncontact WAVs. First, we explored the condensation timeaccording to the distance between cornea and objective lens. Second, after coating the dispersive ophthalmicviscoelastic devices (OVDs) on cornea surface, we rechecked the condensation time in the same manner. Third, werepeated experiment after soaking the objective lens in warm saline. Before 3rd experiment, to determine the optimalsoaking time, we checked the temperature changes after soaking lens for 1, 5, 10, 15,and 20 minutes.
Results The difference in temperature of the lenses soaked for 1 and 5 minutes was not statistically significant. Onthe other hand, the lenses soaked for 10, 15 and 20 minutes showed statistically significant difference compared withthe lenses soaked for 1 minute in the saline. There was no difference in the condensation time between control andOVDs coating group at 1, 3 and 5mm distance from the corneal surface (P = .068, P = .051 and P= .063 respectively).However, the condensation time of the 1 minute warm saline soaking group was higher than that of the control at 1, 3and 5mm distance from the corneal surface (P = .043, P = .041 and P= .043 respectively).
Conclusions A corneal coating with OVDs was not much effective in delaying condensation time while warm salinesoaked lens proved to be simple and effective to get clear surgical view for a long enough time.

• F051

Retinal toxicity by intravitreal liquid perfluorocarbon

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Purpose To report retinal changes in a population of patients who had undergone vitreoretinal surgery using liquid perfluorocarbon (LPFC).
Methods Single centre, retrospective study. The clinical records and images of patients who had undergone vitreoretinal surgery during the 36 months prior to the sanitary alert issued by the Spanish Health Authorities on ALA OCTA LPFC were revised.
Results Four different brands of LPFC had been used during the 36 months period, including ALA OCTA. 128 patients were identified who had undergone vitreoretinal surgery with LPFC of whom 44 had been treated with ALA OCTA. None of the eyes fulfilled the diagnostic criteria of the sanitary alert issued by the Spanish Health Authorities (no light perception+retinal necrosis+optic disk atrophy). No sign of retinal necrosis or severe ocular inflammation was identified in any of the eyes treated with any of the brands during postoperative follow-up or at the final visit. Optic disk atrophy was identified in 6 eyes, and limited venous sheathing was observed in one eye treated with ALA OCTA vs. no cases in eyes treated with other brands. SDOCT revealed retinal ganglion cell layer vacuolization in eight eyes and inner nuclear layer vacuolization in five eyes treated with ALA OCTA.
Conclusions A range of retinal lesions were identified in patients operated on with the aid of LPFC. These changes and lower final visual acuities were more frequently observed but were not exclusive among eyes treated by ALAOCTA LPFC. LPFC toxicity must be carefully evaluated in a case-by-case basis in order to elucidate the role of LPFC and other factors involved

• F052

Late reopening of successfully treated macular holes after combined phaco-vitrectomy ILM peel and gas

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Purpose To demonstrate reduction in reopening of macular holes after minimally invasive suturless vitrectomy and ILM peel combined with phaco compared with published literature
Methods Retrospective analyses of the operation notes and follow up appointments in consecutive patients treated successfully for macular hole with a minimum of 24 months follow up . All patients were included who had combined phaco vitrectomy for macular hole, between 1/1/2011 and 1/4/2014. Anatomical success was confirmed on OCT in all cases within 2 month of surgery. Statistical analysis was performed using chi square to compare the outcomes with published data and assess the significance of these findings
Results Currently in the medical literature, the late reopening rate following successful macular hole surgery is reported to be between 1-9.5% (different surgical techniques used, references available). Late failure has been associated with subsequent cataract surgery and ERM formation. In this study, we report no reopening of macular holes post vitreo-retinal surgery when combined with ILM peel and phacoemulsifcation of the lens. (rate of 0%). We found this difference to be statistically significant as compared to average rates of reopening from the published studies
Conclusions Combination of minimally invasive vitrectomy and ILM peel with phacoemulsification of the lens potentially leads to reduced rates of late macular hole reopening; therefore, may be a preferred method of treatment

• F053

Silicone oil tamponade in the treatment of persistent macular holes

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Purpose Several studies have shown that a pars plana vitrectomy with ILM- Peeling and SF6-gas tamponade can close most of the macular holes. Yet some persist so that it is necessary to perform a pars plana vitrectomy again.
Methods A retrospective study of 36 eyes of 34 patients with a persistent full thickness macular hole after initial pars plana vitrectomy with ILM- Peeling and SF6-gas tamponade who were retreated with silicone oil. Patients were followed for anatomical and functional outcomes.
Results Mean age was 73 years. Twenty-seven women and seven men were included. Anatomical closure of the macular hole was found in 86% after silicone oil tamponade. A significant improvement of the visual acuity was noticed comparing the visual acuity before and after silicone oil. The mean follow up time was 15 months.
Conclusions A retreatment with silicone oil in patients with persistent full thickness macular holes can lead to a high closure rate and improvement of visual acuity.

• F054

Unusual presentation of an intraocular foreign body with double – perforation and retention in lateral rectus muscle

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Purpose To report a rare complicated case of eye injury with endophthalmitis, an air bubble (bacteria-produced), retinal detachment, and traumatic cataract, treated surgically with excellent functional outcome
Methods Retrospective analysis of the hard and electronic notes, CT images, OCT images and operation notes
Results *28 year old male presented 5 days post penetrating injury to right eye, with retained metal foreign body. A gas bubble demonstrated on CT in the right superior globe – believed to be bacteria produced. Multi-stage surgical approach used to treat endophthalmitis, retinal detachment, cataract and removal of FB*

Post-operative outcomes: vision of 6/12 on the affected site, with flat retina, no inflammation and minimal CMO
Conclusions Favourable outcomes are possible with carefully planned and prioritised multi-stage surgical approach, even in complicated cases with late presentation; described approach may help to optimise outcomes in similar eye trauma presentations

• F055

Correlation between intraocular pressure and bottle heights during vitrectomy

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Purpose To determine the correlation between intraocular pressure (IOP) and the bottle heights during vitrectomy usingTONO-PEN®XL applanation tonometer and Icare® PRO rebound tonometer.
Methods Twenty-four eyes of 24 patients who underwent 23-gauge sutureless vitrectomy were evaluated. After complete vitrectomy,the IOP was gradually increased by lifting the irrigation bottle height from the trocar insertion site by 40 cm, 45 cm, 50cm, and 55 cm. The distance between the floor and patient's eye was consistent in all cases (105.5 cm). Before the removal of23-gauge microcannulas, IOP was measured five times using each of the two methods, Tono-Pen®XL and Icare® PRO.
Results The mean IOPs were 8.25 ± 0.35 mm Hg for TONO-PEN®XL and 8.96 ± 0.32 mm Hg for Icare® PRO at 40 cm bottleheight. As the bottle height increased, the differences in IOP was also increased, 10.71 ± 0.37 mm Hg at 45 cm, 14.18 ± 0.39 mmHg at 50 cm and 17.93 ± 0.40 mm Hg at 55 cm for TONO-PEN®XL and 11.48 ± 0.31 mm Hg at 45 cm, 14.64 ± 0.31 mm Hg at50 cm and 18.13 ± 0.38 mm Hg at 55 cm for Icare®PRO. In TONO-PEN®XL, the linear equation was Y = 0.65 X - 18.108 (R2 =0.794, p = 0.000) and the quadratic equation was Y = 0.013 X2 - 0.569 X + 10.446 (R2 = 0.801, p = 0.000). In Icare® PRO, the linearequation was Y = 0.614 X - 15.842 (R2 = 0.820, p = 0.000) and the quadratic equation was Y = 0.010 X2 - 0.306 X + 5.688 (R2= 0.825, p = 0.000). The results show correlation of the quadratic equation was stronger than the linear equation in bothtonometers.
Conclusions The differences of IOP were positively correlated with bottle heights in the form of a curve during vitrectomy.Therefore, the patients who are susceptible to retina or optic nerve damage during vitrectomy should be closely monitored.

• F056

Iatrogenic Ozurdex® injection into the crystalline lens and surgical management

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Purpose Ozurdex® implant is a 700 micrograms implant of Dexamethasone approved for the treatment of macular edema secondary to diabetic retinopathy or retinal vein occlusion. The purpose is to describe the uncommon Ozurdex® injection into the crystalline lens and its management.
Methods We present the case of a woman diagnosed with cystoid macular edema who underwent intravitreal Ozurdex® injection. During the procedure the implant was accidentally injected into the lens body. We also discuss about the surgical management of this complication.
Results The patient was scheduled for phacoemulsification surgery of the lens with implantation of a 3-piece lens into the sulcus because a tear in the posterior capsule was identified during the surgery.
Conclusions Few problems involving the anterior segment in Ozurdex® implants have been described. However, the injection of the dispositive into the crystalline lens is a rare complication we must take into account. Cataract surgery should be performed as soon as possible and we must keep in mind the posible damage of the structures such as posterior capsule or lens zonules. We recommend the management of these cases with a 3-pieces IOL into the sulcus.

• F057

A review of intraocular foreign body injuries and their management in the Palestinian territories 2000-2009

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Purpose To review the causes, management and outcomes of intraocular foreign body (IOFB) injuries presenting to St. John's Eye Hospital in Jerusalem between January 2000- December 2004 and Dr Kanawati Eye Centre in the Palestinian Territories between May 2006-September 2009.
Methods Retrospective review of medical records of patients who underwent surgical treatment for IOFB injuries. Rubber bullet injuries and enucleation/evisceration as a primary repair were excluded.
Results 51 eyes of 49 patients (46 males & 3 females) underwent surgical removal of IOFB. Mean age was 26 years (range 5 to 62). 33 eyes (65%) were due to Hammering without protective goggles and 88% were due to Metallic IOFB. 38 eyes (75%) underwent pars plana vitrectomy with 20 (39%) had lensectomy, intraocular lens 14 (27%), endolaser/indirect laser/cryotherapy 31 (61%), explant 10 (20%), internal tamponade 23 (45%), membrane peel 3 (6%) and intravitreal antibiotics and/or steroids 19 (37%). 8 eyes (16%) had IOFB removed from anterior chamber and transcleral approach in 2 eyes (4%). Visual acuity (VA) at presentation varied with (61%) having Snellen 6/60 or worse. Postoperatively, 35% had 6/6-6/9, 10% had 6/12-6/18, 8% had 6/24-6/36 and 29% had 6/60 or worse. Causes of poor visual outcome were due to retinal detachments (40%) and macular pathology (33%). The remaining 27% were due to endophthalmitis, phthisis, copper-related panophthalmitis and suprachoroidal haemorrhage.
Conclusions IOFB injuries are an important cause of blindness in the Palestinian Occupied Territories. Factors leading to poor visual outcome include IOFB material, poor presenting VA and the presence of vitreoretinal complications due to late presentation. Not only do these injuries affect manual labour workers, but also affect both adults and children as a result of military trauma.

Conflict of interest
Any financial support like travel accomodation hospitality etc provided to you or a member of your staff or an accompanying person?:
Bayer Plc provided me with financial support for accommodation and flights to attend ARVO 2016 in Seattle

• F058

Static retinal vessel analysis in routine optometric practice

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Purpose To evaluate the use of objective retinal vessel calibre measurements in optometric practice and its utility in clinical decision making.
Methods A sub-sample [n=56] was extracted from a prospective study including patients booked for routine eye examinations in optometric practice. All participants underwent a standard examination including subjective refraction and slit lamp biomicroscopy. Undilated fundus photography and/or optical coherence tomography (OCT) was also performed. Optic nerve-centred (camera angle: 50 degrees), red-free photographs were analysed using VesselMap software (Imedos, Germany) to give objective vessel calibre measurements (central retinal artery and vein equivalents (CRAE / CRVE)).
Results Mean age of the cohort was 56 years (range: 21-82yrs; consisting of 32 women and 24 men). Univariate analysis showed a significant association between systolic blood pressure and CRAE which was lost in multivariate analysis (p=0.02). Stepwise forward multiple regression analysis found age to be significantly, negatively associated with CRAE (CRAE: 157au (SD ±20); β=-0.54; p<0.001) and CRVE (β=-0.56; p<0.001), whereas BMI was positively associated with CRVE (198au (SD ±20) au; β=1.84; p=0.005) only. Two patients were measured twice: on initial presentation, one with a significant retinal haemorrhage and one with unilateral papilloedema; both showed normalisation of vessel diameters on follow up.
Conclusions Participants with the largest CRVE had the highest BMI and/or were diabetic. Cross-sectional results from this sample are in agreement with results published from large cohort studies, including the negative association with age and CRAE. Retinal vessel calibres can help provide information on a patient's vascular system and systemic health, and therefore be a useful tool to refine optometric referrals and aid patient monitoring.

• F059

Trial study to automatically distinguish small haemorrhages in early diabetic retinopathy from image artefacts

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Purpose The L*u*v* colour space presented optimal results, with the highest sensitivity and best reproducibility, among RGB, XYZ, CMY, HSL, HSV, HSI and L*a*b* colour spaces. Therefore, we employed three-dimensional analysis of L*u*v* colour spaces to detect early diabetic retinopathy.
Methods Six patients with small haemorrhages were evaluated using fundus photography, which revealed image artefacts in the fundi of some patients. We constructed an experimental device similar to the optical system of a fundus camera and created artificial eyes of the fundus, which were painted with five different colours: rose, coffee, red, orange and yellow. The image artefacts were photographed under each artificial eye using the experimental device. In addition, the following eight types of specimen were used: a dust particle, wool, a piece of paper, a wood chip, cotton, a grey hair, a drop of water and a piece of plastic bag. All images were analysed using Scilab 5.4.0 and SIVP 0.5.3 softwares.
Results We constructed an algorithm to calculate the difference between the averages of the central and circumference areas. In all image artefacts, L*u*v* colour spaces was highly sensitive: L* values were 2.8–8.5, u* values were 3.8–21 and v* values were 4.2–10.1.
Conclusions We succeeded in automatically distinguishing small haemorrhages in early diabetic retinopathy from image artefacts.

• F060

Age macular degeneration: clinical, biological, morphologic, structural biomarkers for neovascular complication

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Purpose To determine clinical,biological,morphologic,structural elements as biomarkers for AMD Neovascular complication
Methods AMD:114 AMD patients,with AMD Neovascular complication. Ophthalmologic exam included ETDRS visual acuity,complete ophthalmic examination,Fundus examination, Multimodal imaging:autofluorescence imaging(FAF),optical coherence tomography(Spectralis HRA-OCT),OCTenFace,Morphology-Structural software(M-S),Fluorescein Angiography,ICG.Cognitive evaluation is done for all of them with MMSE:Mini Mental State Examination(Folstein,GRECO),score let determine various groups,subgroups.Lipidomic Study:Blood tests and analysis,all lipids qualitative,quantitative analysis,all the same for 10 of those 114 patients.Blood test is done during ophthalmologic exam.Plasma congelation"snap frost"after total blood centrifugation,then liquid-liquid extraction for lipids analysis:neutral lipid,fatty acid,phospholipids,as sphingolipids,Polyinsatured fatty acids too
Results MMSE:35% Normal score,62% MCI cases(mild MCI(47%),moderate MCI (35%)),3% early stage AD,cognitive function is rather spared but early AD.Lipidomics:High levels for each and most of lipids,higher/highest for Free,Total Esterified Cholesterol,TxB2,13-HODE,9-HODE,12-HETE,MUFA/PUFA,highest for Eicosanoids,Fames TotalFattyAcid,more/less Phospholipids(PC).Results are effective,statistically significative.Multimodal imaging,M-S:more,mostly drusenoids deposits Protein-Cellular type,"P",individualized,presents,underlined. So,those results,elements become and are Biomarkers for AMD Neovascular complication,allow better AMD follow-up and etiopathogeny understanding
Conclusions Each clinical,biological,multimodal entity,all,together or not,are Biomarkers,allow AMD screening,follow-up,particularly AMD Neovascular complication.They also lead to better etiopathogeny understanding and therapeutics prospects

• F061

Age macular degeneration: clinical, biological, morphologic, structural biomarkers for atrophy complication

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Purpose To determine clinical,biological,morphologic,structural elements as biomarkers for AMD Atrophy complication
Methods AMD:64 AMD patients with Atrophy complication,mostly atrophic areas. Ophthalmologic exam included ETDRS visual acuity,complete ophthalmic examination,Fundus examination,Multimodal imaging:autofluorescence imaging(FAF), (Region Finder Software),optical coherence tomography(Spectralis HRA-OCT),OCTen face,Morphology-Structural software(M-S).Cognitive evaluation is done for all of them with MMSE:Mini Mental State Examination(Folstein,GRECO),score allow to determine various groups,subgroups.Lipidomic Study:Blood tests and analysis,all lipids qualitative,quantitative analysis,all the same for 10 of those 64 patients.Blood test is done during ophthalmologic exam.Plasma congelation"snap frost"after total blood centrifugation,then liquid-liquid extraction for lipids analysis:neutral lipid,fatty acid,phospholipids,as sphingolipids,Polyinsatured fatty acids too
Results MMSE:77% MCI cases(most moderate MCI (30,6%)),quite equal repartition in each score value,MCI subgroup(mild,moderate,intense,severe),quite same impairment in each MCI subgroup.Lipidomics:low levels for each and most of lipids,higher for Sphingosins (highest level),sphingosine1-Phosphate,total neutral lipids,phospholipids total and PC(lowest levels).Results are effective,statistically significative.Multimodal imaging,M-S:more and predominant drusenoids deposits Lipid type,"L",presents,individualized,underlined.So,those results,parameters become and are Biomarkers for AMD Atrophy complication,allow better AMD follow-up and etiopathogeny understanding
Conclusions Each clinical,biological,multimodal entity,all,together or not,are Biomarkers,allow AMD screening,follow-up,particularly AMD Atrophy complication. They also lead to better etiopathogeny understanding and therapeutics prospects

• F062

Retinal astrocytic hamartomas: 2 cases of atypical clinical presentation

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Purpose Retinal astrocytic hamartomas (RAH) are rare benign tumors found mainly in patients with phacomatosis. In these cases, RAH is a major diagnosis criteria.
Methods We report the cases of two patients with 2 different clinical presentations
Results The case 1 is an asymptomatic man without medical history . A voluminous white retinal lesion is discovered incidentally. The ultrasound shows intratumoral calcifications and autofluorescence imaging shows hyperautofluorescent calcified beads. Characteristic moth-eaten spaces are seen on the SD-OCT. The final diagnosis is isolated RAH.
The case 2 is a 56 year old woman suspected of neurofibromatosis (NF) type 2. The fundoscopy found in both eyes a peripapillary whitish flat retinal lesion with blurred edges located on the surface of the retina. There is no autofluorescence nor hyperfluorescence. The diagnosis of plane RAH (= type 1) is made given the context.
Conclusions RAH must be known because of the impact on phacomatosis diagnosis. RAH are associated with Tuberous Sclerosis Complex in about 55% of cases and with NF type 1 and type 2 in 15% of cases. Nevertheless in 1/3 of cases it occurs in healthy subjects. Three types of RAH have been described (plan (case 1), multinodular (case 2) and intermediate). Classical appearance (=type II) is a yellowish nodular "mulberry-like" tumor. It is autofluorescent and hyperfluorescent in late frames of angiography. However, there are less typical presentations which is reported in case 2 and which makes discuss differential diagnosis.
RAH can be a difficult diagnosis for which the clinical history and the multimodal imaging are essential. Neurological opinion and cerebral imaging should complete the investigation to search other diagnosis criteria of phacomatosis before concluding in an isolated form.

F063

Fundus autofluorescence and SD-OCT in progressive cone dystrohy

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Purpose To describe fundus autofluorescence (FAF) and Spectral domain optic coherence tomography (SD-OCT) findings in progressive cone dystrophy (PCD) and evaluate the benefits of these methods for diagnosis.
Methods All patients with the diagnosis of PCD based on color sense, visual field and electrophysiological tests were included. They underwent full ophthalmic examination with best-corrected Snellen visual acuity (BCVA), fundus photography, SD-OCT and FAF.
Results Sixteen eyes of 8 patients were included. Mean age was 36.5 years and 19 years at the beginning of signs. Mean BCVA was 0.18 (range 0.05-0.4). On biomicroscopy, we found changes in the retinal pigment epithelium ranging from barely detectable changes (6 eyes) up to the typical bull's eye appearance (8 eyes). We found central macular atrophy in 2 eyes. OCT showed statistically significant reduction in the thickness and structural changes in the macular retina, predominating at the perifoveolar zone in 8 cases. Atrophy was evident especially in the outer nuclear layer and the ellipsoid zone. Visual acuity was mainly dependent on the degree to which the continuity of the ellipsoid was maintained in subfoveolar. FAF was normal in 2 eyes, showed heterogeneous hyper-FAF in 4 eyes, hypo-FAF in 2 eyes, small area of mild hypo-FAF in the perifoveal region surrounded by a ring of hyper-FAF in 8 eyes. The junction between normal and abnormal outer retina on OCT corresponded to the hyper-autofluorescent ring.
Conclusions OCT and FAF specifies the quantitative and qualitative changes in the macula and may contribute significantly to the diagnosis of the progressive cone dystrophy, particularly in the early stages of the disease which is difficult to diagnose.

• F064
En-face Imaging of epiretinal membrane using swept source optical coherence tomography

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Purpose To define morphologic features of epiretinal membrane (ERM) using en face images from swept-source optical coherence tomography (SS OCT).
Methods Consequtive patients with idiopathic ERM were analyzed for en face imaging analysis within a 6-month period. All patients had undergone 3D volume scan of swept source OCT (Triton OCT, Topcon, Japan). The patients were devided into 3 groups, retinal thickening without retinal hole (Group 1); retinal thickening with lamellar macular hole (Group 2); retinal thickening with macular pseudohole (Group 3). Secondary ERM were excluded from analysis. En face imaging was analyzed on and under the level of ILM.
Results Mean patient age was 63.6±10.8 years (n=77). Mean central retinal thickness (CRT) in group 1, 2, and 3 was 422.3 ± 73.3um (n=51), 334.1 ± 39.6 um (n=34) and 277.7 ± 58.6um (n=12). En face imaging under ILM level well visualized central tractional membrane (CTM), and imaging on the ILM level showed well radiating folds (RF) over the posterior pole. Group 1 had CTM over the fovea (100%), however Group 2 had CTM outside the fovea (94.1%). Group 3 had better BCVA and lesser CRT than the other groups (ANOVA P<0.05)
Conclusions En face SS OCT provides an useful tool to visualize the pathologic features in epiretinal membrane. Lamellar macular hole might be associated with perifoveal or extrafoveal epiretinal membrane and it's tractional force. Macular pseudohole might be associated with ERM or prior macular traction. En face SS OCT provides an useful tool to visualize the pathologic features in epiretinal membrane.

• F065
Visualization of neovascular changes by swept source OCT angiography

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Purpose Instruments for using OCT angiography have recently become available. The aim of this paper is to report the possibilities, advantages and disadvantages of OCT angiography in the clinical diagnosis of retinal and choroidal neovascular diseases.
Methods The OCT angiography images were obtained in patients with retinal neovascular diseases such as AMD and diabetic neovascular retinopathy and in patients with doubtful macular changes. OCT angiography was also performed as a follow up after intravitreal injections.
Results OCT angiography images might be helpful in proper diagnostic process of neovascular changes. The examination is quick, harmless and performed without intravenous contrast. The quality of OCT angiography images depends on patients compliance and translucency of eye optical system. The movement artefacts are the most common.
Conclusions OCT angiography is a new diagnostic tool which might be useful in visualization of pathological vessels and solving diagnostic problems of doubtful changes. It's worth to perform OCT angiography before traditional angiography. It would also be useful in patients with intolerance to fluorescein or indocyanine.

• F066
En face OCT of uncomplicated angioid streaks

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Purpose The Optical Coherence Tomography (OCT) is not a good diagnostic method for uncomplicated angioid streaks. Even the most better resolution imaging forms such as Spectral Domain OCT or Swept Source OCT has no sufficient resolution to distinguish the locations of small splines. The aim of this study is to report the imaging characteristics of uncomplicated angioid streaks using en face Spectral Domain OCT (SD-OCT).
Methods Patients with uncomplicated angioid streaks were imaged using Spectralis SD-OCT. A macular cube composed of 248 µm 20° x 15° 19-line raster scans was obtained. En face SD-OCT characteristics were evaluated by taking images at the retinal pigment epithelium level taking into account all its thickness.
Results Large angioid streaks are visible in en-face SD-OCT as a hiporreflective groove structure, representing the pigment epithelium, surrounded by a hiperreflective area that corresponds to its absence.
Conclusions SD-OCT en face imaging can be used in clinical practice to identify and follow patients with uncomplicated angioid streaks. "Follow-up" functions of the SD-OCT may help in the future to better understantd the behavior of these lesions.

• F067
Outer retinal reflectivity on En-face OCT as a new tool to detect early stage hydroxychloroquine maculopathy

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Purpose Hydroxychloroquine (HCQ) maculopathy can cause irreversible vision loss. Alteration of the parafoveal photoreceptors has been reported to be one of the earliest histopathological sign. The relationship between the ellipsoid zone reflectivity and cone density was recently demonstrated. The main objective of the study was to measure the outer retinal reflectivity in patients taking a HCQ regimen without proven toxicity on routine screening tests. The second objective was to investigate the relationship between the reflectivity measured and the screening tests outcomes.
Methods Consecutive patients visiting for HCQ toxicity screening in the Besançon University Hospital were included. All patients underwent a complete ophthalmic examination with a ten-degrees automated perimetry (with measurement of the foveal threshold and the mean 2-5 degrees), fundus autofluorescence, multifocal electroretinogram (with measurement of N1, P1 and N2 amplitudes in a 2-5° range) and spectral-domain optical coherence tomography with en-face reconstruction of the ellipsoid zone and the retinal pigment epithelium (with measurement of the absolute reflectivity expressed in greyscale in the 2-5° range).
Results 76 eyes were studied (39 patients). None of them displayed a toxic maculopathy. The cumulative dose for HCQ ranged from 24 to 2400g (706g±620). Bivariate analysis showed a decreased in ellipsoid reflectivity with escalating cumulative doses of HCQ (linear regression, $p<0.0001$, $r^2 : 0,3$). Reflectivity was also correlated with N1, P1 and N2 amplitudes ($p<0.05$). Finally, reflectivity was statistically correlated with 5 degrees threshold perimetry. ($p<0.005$).
Conclusions Parafoveolar ellipsoid reflectivity with en face OCT could be a rapid, repeatable and quantifiable biomarker allowing to detect the HCQ maculopathy earlier than any other screening method currently used.

• F068

Modern diagnostic methods used in macular telangiectasia

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Purpose Presenting an assessment of new, various diagnostic methods used in patients with macular telangiectasia -– an idiopathic, uncommon disorder characterized bytelangiectatic vessels in the juxtafoveolar region.
Methods The study included 5 patients with macular telangiectasia treated in theDepartment of Ophthalmology and Ocular Oncology, Jagiellonian University, CollegiumMedicum in Cracow. The patients were enrolled in an observational study and evaluatedusing various diagnostic and treatment methods. The examination included BCVA, funduscolor photo, fundus autofluorescence, fluorescein angiography, DRI OCT-1 AtlantisTOPCON and OCT-angiography (AngioVue). Retinal layers, the region bounded by the outer retina, Bruch's membrane, choriocapillaris, and the remaining choroidal vasculature were assessed.
Results In all 5 patients with macular telangiectasia, the telangiectatic vessels wereidentified in fluorescein angiography, showing leakage in late phase. DRI OCT-1 allows to abetter assessment of the neurosensory retina and demonstrate small foveal cystoid cavitieswith destruction of inner and outer layers, which is typical of this disease. This isvery useful in differentation with choroidal neovascularization in the wet type of AMD orcystoid macular oedema and helps to determin the severity of the disease. In all the patients OCT-angiography (AngioVue) enabled a visualization of very small retina vessels, but not a diagnosis of the neovascularization and leakage.
Conclusions The results of our observation indicate that fluorescein angiography and DRIOCT-1 seem to be the most useful diagnostic methods in macular telangiectasia, but OCT-angiography can provide an alternative assessment method especially in patients with contraindications for fluorescein angiography. Further studies comprising a wider group of patients are necessary.

• F069

Ganglion cell-inner plexiform layer thickness and visual improvement after vitrectomy for rhegmatogenous retinal detachment

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Purpose To evaluate the association of postoperative macular ganglion cell-inner plexiform layer (GCIPL) thickness with postoperative visual outcomes in patients undergoing vitrectomy for macular–off rhegmatogenous retinal detachment (RRD) using spectral domain optical coherence tomography.
Methods Data from 22 eyes with macular-off RRD who were followed for more 6 months after successful pars plana vitrectomy were analyzed. Macular GCIPL thickness in eyes with RRD was compared with that of the normal contralateral eyes 6 months after surgery. The correlation between the interocular difference in GCIPL thickness and postoperative best corrected visual acuity (BCVA) was evaluated.
Results Preoperative and postoperative central macular thickness were 538.09 ± 318.42 μm, 230.77 ± 34.69 μm. Mean GCIPL thickness was significantly decreased with time after surgery (3 months vs. 6 months, $P < 0.01$). Mean GCIPL thickness in eyes with RRD 6 months after surgery were 61.04 ± 12.04 μm and in the unaffected contralateral eyes were 73.67 ± 6.73 μm. The interocular difference in macular GCIP thickness was significantly correlated with postoperative BCVA. Among patients with intact photoreceptor layers, a greater decrease in GCIPL thickness was correlated with a worse postoperative BCVA ($r = 0.629$; $P = 0.02$). No significant correlation were identified between interocular macular GCIPL thickness difference and age ($r = 0.629$; $P = 0.85$), axial length ($r = 0.874$; $P = 0.43$).
Conclusions Macular GCIPL thickness decreased after vitrectomy to repair for RRD. The decrease in GCIPL thickness was significantly correlated with postoperative visual outcomes.

• F070

Spectral domain optical coherence tomography for detecting retinal arterial macroaneurysm

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Purpose Retinal arterial macroaneurysm (RAM) is an acquired sacular dilatation of a retinal arterial vessel. It is commonly associated with systemic arterial hypertension, vascular disease and women. It often appears in the sixth decade of life or older. RAMs are usually classified into three forms: quiescent, hemorrhagic and exudative. The first of them are asymptomatic, the exudative form courses with loss of visual acuity and the hemorrhagic form is responsible of hemathomas (either subretinal, intraretinal, retrohyaloid or intravitreal). The aim of this study was to describe retinal structural changes and tomographic features associated with RAM.
Methods A case report of an otherwise healthy middle aged man who was diagnosed with a RAM in his right eye and who underwent Heidelberg spectral-domain optical coherence tomography (SD-OCT).
Results SD-OCT was able to demonstrate and measure the RAM and the upstream/downstream vessel. Likewise, it showed other related OCT changes in the adjacent retina such as the presence of subretinal fluid and macular edema.
Conclusions SD-OCT is an effective tool for detecting retinal macroaneurysms. It also provides important supplementary clinical information that may be helpful in planning the management of macroaneurysm, without the need for ancillary tests.

• F071

Enhanced visualization of retinal vasculature in fundus images through image processing

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Purpose To develop a digital filter that enhances visualization of retinal blood vessels.
Methods Four-hundred 24-bit color fundus images were analyzed and properties of red, green, and blue channels were extracted. Then, using hemoglobin absorption coefficients, the relevant weights for gray-scale conversion that emphasizes retinal vessels were calculated. To evaluate images, edges were detected via convolutional 2D Laplacian kernel from the processed images, and the number of edges, number of effective edges, and sum of intensities of edges were evaluated.
Results The values of weights for red, green, and blue channels were calculated to be -0.0572, 0.7335, and 2.2079, respectively. When comparing the images that were processed using the new digital filter based on these values with the original image, gray-scale, green, red, blue, and green and blue digital filter images, the number of edges, effective edges, and sum of intensities of edges were all found to be significantly higher in the images processed with the new filter ($P < 10\text{-}16$).
Conclusions The RGB filter developed here was based on actual fundus images. The hemoglobin absorbance reinforced the edges of retinal blood vessels, verifying that the new RGB filter can enhance the visualization of retinal vasculature.

Conflict of interest
Any research or educational support conditional or unconditional provided to you or your department in the past or present?:
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• F072

The effect of center shift on the measurement of macular thickness: A spectral domain optical coherence tomography study

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Purpose To evaluate the effect of spectral domain-optical coherence tomography (SD-OCT) measurement center shift on the measurement of macular thickness.
Methods Prospective observational case series. A total of 60 normal eyes of 60 subjects included in the study. SD-OCT macular scanning (macular cube 512 × 128 scan) was performed twice by an experienced examiner. The average retinal thicknesses of the nine macular sectors as defined by the Early Treatment Diabetic Retinopathy Study (ETDRS) were recorded. Each coefficient of repeatability was calculated for the macular thickness measurements of the ETDRS subfields. Thereafter, the measurement center was manually decentered to a seven scan point, each from the central fovea in steps of 58.7 μm horizontally and 47.2 μm vertically. At each shift point, the change in the macular thickness was compared.
Results When the displacement distance between the measurement center point and the foveal center was within 117.4 μm horizontally and 141.6 μm vertically, the macular thickness measurements did not show any significant differences. However, if the offset of the EDTRS grid center from the anatomic fovea exceeded, we noted that the thickness at the fovea increased and the opposite-direction region at the inner circle was significantly thinner than the displaced point.
Conclusions The effect of measurement center shift needs to be considered when analyzing the macular thickness measurements in various ophthalmologic diseases.

• F073

Tomographic analysis of the retinal layers in diabetic macular edema treated with dexamethasone intravitreal implant

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Purpose To study the morphological alterations in the individual retinal layers of patients with diabetic macular edema (DME) treated with dexamethasone intravitreal implant.
Methods Retrospective, observational study of patients with center-involving DME treated with a single dexamethasone implant as primary or secondary treatment, and with at least two follow-up visits. Central thickness of each retinal layer was obtained with optical coherence tomography automated segmentation (Heidelberg Spectralis Engineering, Germany), with manual correction as needed.
Results Twenty one eyes of 18 type 2 diabetic patients were included (median HbA1c 7.1%). The median time of follow-up after treatment was 8 weeks (visit 1) and 4 months (visit 2). At visit 1, a significant reduction in central macular thickness (CMT) (480±24 to 325±134), retinal nerve fibre layer (RNFL) (21±1 to 18±2), ganglion cell layer (GCL) (30±2 to 22±1), inner nuclear layer (94±15 to 46±6), outer plexiform layer (OPL) (35±3 to 28±1), outer nuclear layer (ONL) (176±14 to 117±18) and retinal pigment epithelium (RPE) (29±7 to 15±5) was noted ($p<0.05$ for all layers). At visit 2 there was a significant increase in CMT, (424±270), although still lower than the baseline; there was also a significant increase in RNFL (25±3), GCL (30±3), OPL (40±3), ONL (146±20) and RPE (24±5) ($p<0.05$). There was no difference in inner plexiform layer (IPL) or outer retinal layers thickness over time. Seven eyes had neurosensorial detachment (NSD) at baseline, versus 0 at visit 1 and 2 at visit 2.
Conclusions The reduction in CMT noted in patients with diabetic macular edema treated with dexamethasone intravitreal implant is mostly due to resolution of NSD (which accounts to the automated RPE thickness) and the layers above external limiting membrane, except for IPL. This effect is highest at the first follow-up visit.

• F074

Deep learning approach for diabetic retinopathy screening

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Purpose Diabetic retinopathy (DR) is the major cause of blindness in the working-age population. With an increasing number of diabetic patients worldwide, automated screening tools become indispensable. Recent progress in machine learning and image analysis enables efficient automated screening.
Methods DreamUp Vision uses state-of the art technology based on deep-learning. Our algorithm was trained on over 70000 labeled retinal images. Images were graded by ophthalmologists as follows: 0 (no retinopathy), 1 (mild non proliferative DR), 2 (moderate non proliferative DR), 3 (severe non proliferative DR) and 4 (proliferative retinopathy). Each patient in the dataset is represented by two images of left and right eyes. Grading is done for each eye image separately. Our algorithm performs quick and reliable detection of anomalies in retinal images, diagnoses their stage of diabetic retinopathy and provides the location of the anomalies detected in the pictures. We consider a patient as referable if the DR stage is between 2 and 4, otherwise we consider the patient as non-referable. We evaluate our model on over 10000 fundus images from 5000 patients taken from the Kaggle DR Detection Challenge dataset, provided by California Healthcare Foundation.
Results Our algorithm achieves an area under the receiver operating characteristic curve AUROC of 0.946 with 96.2% sensitivity (95% CI: 95.8 - 96.5) and 66.6% specificity (95% CI: 65.7 - 67.5) for identifying referable DR on the Kaggle dataset.
Conclusions The performances we have obtained enable a reliable automated DR screening. As the amount of available labeled data grows and given our technology's ability to learn from labeled images, we believe that significant performance improvement can be achieved. The same process can be applied to the detection of other eye diseases as well.

Conflict of interest
Any consultancy arrangements or agreements?:
DreamUp Vision Consultant

• F075

Iluvien monotherapy for diabetic macular oedema in vitrectomised and non-vitrectomised eyes: one year data

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Purpose To assess the effectiveness of the Fluocinolone intravitreal implant (Iluvien) in patients with diabetic macular oedema (DMO) following previous pars plana vitrectomy (PPV) for proliferative diabetic retinopathy (PDR). The data from vitrectomised eyes are compared with a consecutive group of non-vitrectomised eyes with DMO who received the Iluvien implant in our institution.
Methods Retrospective analysis of a consecutive series of patients who received the Iluvien implant for DMO. Best-corrected visual acuity (BCVA) and central retinal thickness (CRT) were evaluated at baseline and 0-2 months, 3-5 months and 6-12 months following placement of the implant. Analysis of variance was carried out using Stata 14.1 (StatCorp LP) Software.
Results Seven eyes with recent PPV and 17 eyes without previous PPV received an Iluvien implant for DMO. Mean improvement in BCVA in the PPV group to 6-12 months was 0.33 logMAR (95% CI: -0.2-0.8) compared with 0.13 logMAR (95% CI: 0.0-0.2) in the no PPV group ($p=0.355$). Mean improvement in CMT in the PPV group to 6-12 months was 59.6μm (95% CI: 18.0-137.2) compared with 78.4μm (95% CI: 21.3-126.9) in the no PPV group ($p=0.745$). Individual OCT images showed persistent cystoid macular oedema in 7/7 eyes in the PPV group. A persistent pre retinal hyper-reflective line at the macula suggestive of residual cortical vitreous or pre retinal membrane was identified in 4/7 eyes in the PPV group and 9/17 eyes in the non-PPV group.
Conclusions Vitreoretinal interface proliferation may explain the absence of a response to intravitreal Iluvien in some DMO eyes. Prospective randomised studies are needed in order to establish a uniform evidence based approach for classification and treatment in vitrectomised eyes.

• F076

Frequency doubling technology perimetry and retinal fiber layer correlation in type 2 diabetics without retinopathy

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Purpose Alterations in visual field (VF) and retinal nerve fiber layer (RNFL) thickness were reported in diabetics. Little is known however about the extent to which VF and RNFL changes are affected and their correlations. The purpose was to assess the RNFL thickness and its correlation with VF parameters in type 2 diabetics without retinopathy with well controlled glucose level and good standard visual acuity.
Methods A total of 28 controls and 16 type 2 diabetics without retinopathy were recruited. VF was assessed with the frequency doubling technology (FDT) perimeter using the full threshold C-20 program. The RNFL thickness was acquired by the optical coherence tomography 200 x 200 optic disc cube scanning protocol. Forward stepwise multiple linear regression analysis was applied to rule out the independent association of the RNFL thickness with the FDT parameters.
Results Compared to the controls, the diabetics showed a trend of decreased RNFL thickness but was not significant, lower sensitivities for some VF locations, no difference in the mean deviation, and worse mean pattern standard deviation (PSD) (3.89 ± 0.36 vs. 3.47 ± 0.58 dB, $p < 0.05$). The RNFL thickness was significantly negatively correlated with PSD ($r = -0.6$, $p < 0.05$).
Conclusions Apparent VF changes precede RNFL thickness thinning in type 2 diabetics without retinopathy. Also, the RNFL thickness shows a negative correlation with the PSD of the FDT parameter.

• F077

Diabetic maculopathy screening in England; are we seeing too much?

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Purpose The England screening service classification of diabetic retinopathy has strict, quality assured criteria to identify potential diabetic maculopathy termed 'M1.' All new M1 cases identified by the screening service are referred to a hospital service. We aimed to evaluate the effectiveness of the England National Diabetic Eye Screening R1M1 classification of diabetic maculopathy as a criteria for secondary care referral in Portsmouth, UK.
Methods Retrospective audit of all patients referred to Portsmouth Hospitals NHS Trust with R1M1 pathology from April 2013 to January 2014. The total number of referrals received for this period was noted as well as the number of patients followed up in subsequent care pathways. Follow-up data on those who remained under hospital care is presented for three years.
Results A total of 306 diabetic patients were referred to Portsmouth Hospitals NHS Trust for R1M1 pathology over a 10 month period. At the first hospital appointment 135 (44%) had no fluid present on macular SD OCT and were either referred back to screening if the M1 features had resolved (65) or followed up with retinal images (70). 115 (38%) patients were considered to require further follow-up in secondary care. Of those patients remaining in secondary care 70 remained in active follow up 3 years later.
Conclusions These results would suggest that 44% of those with M1 features have no evidence of diabetic maculopathy on OCT at the initial hospital appointment and were discharged to community screening. Follow-up for over three years in a secondary care setting is required by 23%. Secondary service could be better utilised by streamlining referrals either by refining the R1M1 classification or developing community based OCT service

• F078

Correlation between choroidal and retinal thickness in diabetic patients without diabetic retinopathy

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Purpose This study was design to examine the correlation between retinal and choroidal thickness in diabetic patients without diabetic retinopathy.
Methods 125 type 2 diabetic patients without diabetic retinopathy underwent a complete ophthalmological examination. Retinal total thickness and retinal layer automatic segmentation were assessed by using spectral domain optic coherence tomography (Spectralis Heidelberg Engineering). Retinal measures were made at fovea and at 3 mm temporal (T3), nasal (N3), superior (S3) and inferior (I3) to the fovea. Choroidal Thickness (CT) was assessed with enhanced depth mode (EDI) software (subfoveal and at 1000 µm temporal, nasal, superior and inferior to the fovea). Pearson correlations were analyzed between CT and RT (total and by layer) at the five locations of study: subfoveal CT with central RT; and CT at the 1000 µm temporal, nasal, superior and inferior to fovea's center with RT at the T3, N3, S3 and I3, respectively.
Results Diabetic patients were in average 66.9. ± 9.33 years old with an average disease duration of 93.50 ± 81.74 months. Except for the pigmented epithelium retinal layer, which showed a positive, but weak correlation with CT at N3, S3 and I3 (r between 0.25 and 0.32, $p < 0.05$), the analyze didn't showed a statistical significant correlation between CT and the thickness of the other retinal layers.
Conclusions Recent studies empathize the role of a choroidal vasculopathy in diabetic retinopathy pathogenesis. The absence of correlation between CT and RT may be related to changes in the choroid occur in earlier stages of the disease. Future longitudinal studies are needed in patients at different stages of diabetic retinopathy.

• F079

SD-OCT for study of retinal layers segmentation in patients under Hydroxychloroquine treatment

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Purpose Hydroxychloroquine has been used for decades in treatment of rheumatic disorders. Macular toxicity is an adverse effect dependent to duration of treatment and daily dosage. Although, the exactly retinal structure under this toxic effect is not yet totally understandable.
To study the sectorial effect of Hydroxychloroquine in all retinal layers in 1st, 2nd, 3th and 6th mm centered on fovea by automatic segmentation using Spectral-Domain Optical Coherence To*mography.*
Methods Retrospective, non-randomized study involving 44 eyes of 44 patients under treatment with Hydroxychloroquine. The authors have created two age-matched groups. A group 1 of patients in treatment duration under 10 years (n= 30) and a group 2 above 10 years of treatment (n= 14).
Results The inner retinal layers thickness of 1st and 2nd mm is impaired in group 2 but the results did not showed significant difference between groups. The automatically segmentation of layer by layer did not prove a sectorial defect in inner retina. The thickness of Outer Nuclear Layer (ONL) was impaired in group 2, in opposition to Outer Plexiform Layer (OPL). This analysis has demonstrated a tendency for inversion of ONL and OPL thickness values in both groups.
Conclusions The toxicity of Hydroxychloroquine apparently was not responsible for significant alterations in inner retinal thickness. That is a tendency for reduction in ONL thickness. The higher thickness of OPL in group 2 is a surprising aspect that needs additional analysis. The outcomes were very dependent to the limited number of patients in our sample. Further longitudinal studies about this topic will be necessary.

• F080

Vitreous and serum VEGF levels after intravitreal injection of bevacizumab, ranibizumab and triamcinolone acetonide in patients with proliferative diabetic retinopathy

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Purpose To compare ocular and systemic vascular endothelial growth factor (VEGF) antagonizing effect of bevacizumab (IVB), ranibizumab (IVR) and triamcinolone acetonide (IVT) following intravitreal injection in eyes with proliferative diabetic retinopathy (PDR).
Methods Thirty-one eyes of 28 patients with diabetic retinopathy and 21 eyes of 21 non-diabetic patients having various vitreoretinal diseases underwent vitrectomy. Eyes with PDR were injected with IVB (n=7), IVR (n=10) or IVT (n=6) 3 days prior to vitrectomy. The non PDR eyes (n=8) was not injected. Vitreous and serum samples were obtained during vitrectomy. Serum and vitreous VEGF levels were analyzed using ELISA.
Results Mean (±SD) vitreous VEGF level in diabetic eyes was higher than that of non-diabetics (1275.76 ± 3441.63 pg/mL vs. 82.66 ± 100.71 pg/mL, P<0.001) while serum VEGF level did not differ (630.17 ± 981.72 pg/mL vs. 506.51 ± 825.64 pg/mL, P=0.89). In diabetic eyes, VEGF levels in serum and vitreous was similar (P>0.05) while in non-diabetics, serum VEGF level was higher than vitreous VEGF level (P<0.001). In non-diabetics, there was lower vitreous VEGF levels than that of IVB, IVR, IVT injected eyes with PDR or non-injected eyes with non-PDR (P=0.002, P<0.001, P= 0.003 and P=0.002, respectively). There was no difference among serum VEGF levels within PDR subgroups (P>0.05). IVT suppressed vitreous VEGF level more than IVR did (298.36 ± 442.14 pg/mL vs. 1525.01 ± 2605.95 pg/mL, P= 0.03), however after adjusting total protein level, no significance was remained (P=0.193).
Conclusions Vitreous VEGF level was similarly affected 3 days after injection of IVB, IVR and IVT.
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• F081

The change of Ganglion cell layer and Inner plexiform layer thickness in Type 2 DM with non-proliferative diabetic retinopathy

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Purpose To evaluate each retinal layer's thickness change in Type2 DM patients with non-proliferative diabetic retinopathy by using Optical Coherence Tomography(OCT)
Methods We compared the thickness of each retinal layers by using OCT in 102 eyes, composed of normal control 60 eyes and NPDR 42 eyes. The thickness of these 7 layers were measured; retinal nerve fiber layer(RNFL), ganglion cell layer(GCL), inner plexiform layer(IPL), inner nuclear layer(INL), outer plexiform layer(OPL), outer nuclear layer(ONL), and retinal pigment epithelium(RPE). We excluded the patient who had refraction rate less than -6D or greater than +3D, patients who had retinal disease other than diabetic retinopathy, and patient who had preretinal membrane, macular edema,. The each layer's thickness was measured in 4 different regions, 3mm away from central fovea; superior, inferior, nasal, and temporal direction.
Results The thickness of each layer at all 4 different regions of GCL was thicker in normal control group than in NPDR. The average difference was 4.92 and the result showed statistical significance in all four regions. Also, normal control group have thicker thickness in all four regions of IPL and the average difference was 2.67 . The nasal, temporal, superior regions showed statistically significant correlation, but the inferior region did not. However, normal control group and NPDR group had no significant difference in layer's thickness at RNFL, INL, OPL, ONL, RPE layers.
Conclusions When we compared and measured each retinal layer's thickness by OCT, the normal group showed thicker layer's thickness in GCL, IPL layers than NPDR group but had no significant difference in RNFL, INL, OPL, ONL, RPE layers. In conclusion, the thinning of Inner retinal layers such as GCL, IPL might be used as a useful tool to diagnose and follow-up in early diabetic retinopathy.

• F082

Improvement of diabetic macular edema after micropulse laser therapy

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Purpose MicroPulse technology (MP) is a new technique using a subthreshold laser micropulse. The desired effect is to reduce the laser damage to ocular tissue; its application in the macular area is very promising in order to treat diabetic macular edema (DME) with the less retinal damage.
We present our 6 months experience with MicroPulse Laser Therapy in DME using a new multifunctional laser, the IRIDEX IQ577.
Methods We used MP as first-line therapy in cases of diffuse DME if central macular thickness (CMT) was < 300 µm. However, if DME was diffuse and CMT was > 400 µm, we began anti-VEGF therapy to reduce CMT and improve vision as quickly as possible. We began with the laser set in traditional settings. We placed a test spot in a non-edematous area of the retina and we increased the power up moving to a new area each time, until we note a thermal reaction (white burn). In the second step, we switch the laser to the micropulse setting and perform MP over the area of edema with a high-density grid treatment.
Results Ten eyes of 8 patients were included. Mean age at diagnosis was 63.5 years. Best-corrected visual acuity was 0.88 logmar (range 1.7-0.3) before treatment. After three months of MP, it improved to 0.67 logmar (range 1.4-0.2), p: 0.002. CMT was 367 um, and improved to 316.5um (p: 0.14) at 1 month after treatment and to 291.2 um at 3 months (p: 0.04). OCT detected early retinal reflectivity changes after treatment. All patients reported subjective improvement. No adverse events were observed during follow-up.
Conclusions MP laser is an effective laser to treat DME. Moreover, the attractive safety profile of MP treatment allows clinicians to offer earlier treatment to prevent tissue damage and the development of visual disability.

• F083

Novel OCT prognostic indicators in diabetic macular oedema

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Purpose Despite advances in optical coherence tomography (OCT), clinicians have few prognostic indicators. We chose anomalous features found in OCTs, and retrospectively analysed OCT images for subsequent progression in visual acuity (VA), OCT results and interventions required over 22-24 months.
Methods Putative risk factors were grouped into sets based onsimilar putative aetiology:
· sub-retinal fluid and large cysts,
· hyperreflective dots,
· partial/total disorganisation of retinal innerlayers (DRIL) and photoreceptor disruption,
· epiretinal membranes, vitreomacular traction,vitreomacular adhesion.
Eyes were stratified according to how many of these groupsof features they displayed (0—4) and were all treated as per protocol andclinical need.
Results Increasing risk factors correlated with increasing initial OCT central retinal thickness (CRT) (387 vs 555) and volume (9.99 vs 11.28), and poorer initial visual acuity (0.41 vs 0.60) on presentation.

Whilst final CRT results showed no significant differences between the groups (325-248 nm), and no significant differences between numbers of injections performed (6.8 vs 7.35), more features correlated with poorer VA, both absolute and relative to baseline, irrespective of whether there had been previous treatment.
Conclusions These features are better prognostic indicators than OCT measurements alone.

• F084

Macular thickness in diabetic eyes without clinical macular edema

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Purpose To evaluate macular thickness of individuals with moderate diabetic retinopathy (DR) without macular edema (DME).
Methods Retinal thickness was calculated by automated segmentation of spectral domain-optical coherence tomography scans of patients with moderate DR without DME and compared with an age-matched population of non-diabetic individuals. Mean values and multiple linear regression analysis were used to determine the relationship between retinal layers thickness and age, sex, diabetes type and concentration of glycosylated hemoglobin (HbA1c).
Results A total of 66 eyes were studied, 34 eyes with moderate DR without DME or previous treatment and 32 eyes from non-diabetic individuals. The mean retinal nerve fiber layer (RNFL) thickness in the superior parafoveal area of patients with DR was 29.88 µm vs. 23.18 µm in the non-diabetic group (p=0.01). The mean inner nuclear layer thickness in the central fovea area in the DR group was 28.26 µm vs. 22.87 µm in the non-diabetic control group (p=0.01). There was a significant linear correlation (R=0.353, p=0.04) between HbA1c and the inner nuclear layer thickness in the superior parafoveal area.
Conclusions According to our findings, DR patients showed an increase of macular thickness compared with the non-diabetic control group in the superior parafoveal and central foveal area. Increased HbA1c levels may play a role in the increased macular thickness.

• F085

Contribution of wide field angiography to diabetic macular edema

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Purpose To evaluate diabetic macular edema in non proliferative diabetic retinopathy (NPDR) using a wide field fluorescein angiography.
Methods In a retrospective study, consecutive wide-field angiographs using the Heidelberg Retina Angiograph 2 with a contact lens system Staurenghi and SD-OCT were performed in diabetic patients with non proliferative diabetic retinopathy.
Results A total of 71 eyes in 39 diabetic, average age was 58 years (SD 12). Most of the patients had type 2 diabetes mellitus (92%) and average duration since diabetes diagnosis was 10 years. Mean HA1c was 7.4%. Distribution of NPDR severity was: mild NPDR in 6% of eyes, moderate NPDR in 21% and severe NPDR in 73%. Macular edema was found in 53%. A thicker retina was observed in eyes with peripheral non perfusion (353µm vs. 254µm ***p=0,006***). Retinal non perfusion was associated with macular edema (97% vs. 76%, ***p=0,01***) and poor visual acuity (***p<0,001***).
Conclusions Diabetic macular edema seems to be strongly associated with peripheral retinal non perfusion. So treatment and management of diabetic macular edema may be reconsidered using either a targeted laser treatment in the area of retinal non perfusion or anti-VEGF intravitreal injection.

• F086

Peripheral vessel leakage in diabetic retinopathy using Wide field retinal angiography

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Purpose To evaluate the peripheral vessel leakage in patients with non proliferative diabetic retinopathy (NPDR) using a wide field fluorescein angiography
Methods In a retrospective study, consecutive wide-field angiographs obtained using the Heidelberg Retina Angiograph 2 with a contact lens system Staurenghi, were graded in: peripheral vascular leakage, areas of retinal non perfusion , retinal neovascularization observed overly of conventional 7 standard fields.
Results A total of 71 eyes in 39 diabetic patients were included. Distribution of NPDR severity was: mild NPDR in 6% of eyes, moderate NPDR in 21% and severe NPDR in 73%. Findings included angiographic peripheral vessel leakage in 85%, peripheral non perfusion in 87% of eyes, neovascularization in 14%, macular edema in 53%, and macular ischemia in 4%. Peripheral vessel leakage was associated with peripheral non-perfusion (***p<0.001***) but not with retinal neovascularization (53% vs. 35%, ***p=0.01***), neither with macular edema (***p=0.449***).
Conclusions This study had characterized peripheral vessel leakage (PVL), and shown a correlation with peripheral non-perfusion. Peripheral non-perfusion and PVL appeared to be markers of active diabetic retinopathy.

• F087

The predictive value of retinal fixation for the visual outcome after anti-VEGF treatment of diabetic macular oedema with center involvement

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Purpose Diabetic macular oedema involving the foveal center can be treated with intra-vitreal anti-VEGF injections. However, the beneficial effect of this treatment is not unequivocal and presently no known parameter can differentiate patients who benefit by an improved visual acuity after the treatment from the patients who do not. Therefore, the present study aims to investigate the relation between visual acuity and retinal fixation area as a putative predictive parameter for the visual acuity after anti-VEGF treatment in a planned prospective study.
Methods 60 eyes from 30 diabetic patients (mean age 61 years) with clinically significant macular oedema were subjected to examination of fixational eye movements before each of three monthly anti-VEGF injections and at 1- and 4-month follow-up. Fixational eye movements were recorded for both eyes during binocular and monocular vision using a video based eye-tracking system. The fixational saccades and the bivariate contour ellipse area (BCEA) were analyzed using standardized algorithms.
Results The data from the baseline examination shows a linear correlation between best-corrected visual acuity and the retinal fixation area estimated by the monocular bivariate contour ellipse area in the studied eyes (r2=0.21, p<0.01).
Conclusions Reduced visual acuity is followed by an increased fixation area in patients with diabetic macular oedema with center involvement. Prospective data will show whether the retinal fixation area can be used as a predictive parameter for the visual prognosis after anti-VEGF treatment of diabetic macular oedema.

• F088

Selective Retina Therapy (SRT) for diabetes macular edema in Korean patients: 12-months results

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Purpose Selective Retina Therapy can induce proliferation and migration of retinal pigment epithelium (RPE) cells at SRT- irradiated areas without damaging photoreceptor cells. We demonstrate 1-year clinical results of SRT for clinically significant diabetic macular edema (DME) in Korean patients.
Methods Prospective nonrandomized interventional case series study. Twenty-three eyes of 21 patients with clinically significant DME were treated with SRT and followed up for 12 months. After analysis of the correlation between the RM value and FFA visibility, the sensitivity and specificity of reflectometry was calculated. We measured best-corrected ETDRS visual acuity (BCVA). Microperimetry was employed to measure the macular sensitivity within the central 10° visual field, and the central macular thickness (CMT) and maximum macular thickness (MMT) were measured at every 3 months. Patients were considered for retreatment at 3 months if there was no decrease in CMT.
Results Thirteen of 23 eyes were included for the analysis of 1-year results. BCVA improved from 69.5 letters at baseline to 76.23 letters at 6 months and 71.3 letters at 1 year. Although change in CMT did not demonstrate a significant change at two-time points, MMT were decreased from 446.7 ± 78.4μm to 423.5 ± 76.5μm , 408.5± 59.6 at 6months, 12 months (all P<0.05) and mean macular sensitivity were increased from 21.5 ± 3.1db to 22.9 ± 2.4 dB, 23.2 ± 2.5 dB respectively. (P=0.009, P=0.001). Additional SRT was performed for nine eyes (69.2%).
Conclusions In 9 of 23 eyes (39.1%), BCVA was maintained or improved by SRT monotherapy during 1 year follow-up period. The improvement in maximum macular thickness (MMT) and macular sensitivity support that SRT treatment could be effective and safe modality in Korean patients with clinically significant DME.

• F089

Comparison of efficacy of intravitreal ranibizumab and aflibercept in eyes with diabetic macular edema

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Purpose To compare the efficacy of intravitreal ranibizumab (IVR) and intravitreal aflibercept injection (IVA) injections on diabetic macular edema (DME).
Methods The medical records of 49 eyes of 36 patients who were diagnosed with DME and had received IVR treatment from March to December 2014 and 46 eyes of 40 patients who had received IVA treatment from December 2014 to October 2015 were reviewed. The IVR and IVA were injected pro re nata. The central macular thickness and best-corrected visual acuity (BCVA) were measured at 1, 3, and 6 months after the IVR or IVA. The mean number of injections of IVR injections was 2.6±1.1 and of IVA was 2.7±1.4. None of the clinical data, e.g., sex, age, HbA1c, BCVA, and CMT before treatment were significantly different between the IVR and IVA groups.
Results The CMT was significantly thinner at 6 months after the IVR and the IVA (P<0.05). The mean BCVA was significantly better only at 3 months after the IVR and at 1 and 6 months after the IVA (P<0.05). The CMT of eyes with serous retinal detachment (SRD) was significantly thinner at 1 and 3 months after IVA, and at only at 6 months after IVR (P<0.05). The BCVA of eyes with a SRD was significantly thinner at 6 months after the IVR, and at 1 month and 6 months after the IVA (P<0.05). In eyes with the previous IVR treatment, the CMT was significantly thinner during the observation period after the IVA but the BCVA was not significantly improved at any time after the IVA.
Conclusions The effectiveness of IVA persists longer than that of IVR. The effectiveness of both IVR and IVA was not dependent on the presence of a SRD. We conclude that IVA may be effective in reducing the CMT in DM eyes refractory to IVR.

• F090

Factors influencing intravitrealBevacizumaband triamcinolone treatment in patients with diabetic macular edema

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Purpose To evaluate factors associated with the response of intravitrealbevacizumab (IVB) and intratreal triamcinolone acetonide (IVTA) in diabetic macular edema (DME)
Methods 71 eyes of 55 patients with DME were incorporated in this retrospective study. Group 1 included eyes showed good response to IVB. Group 2 included eyes which did not respond to IVB but responded to IVTA. Group 3 included eye which did not respond to both. Clinical factors, HbA1c and optical coherence tomography (OCT) findings including patterns of macular edema were compared among three groups
Results 44, 27, 20 eyes were included in group 1, 2, and 3, respectively. HBA1c was higher in group 3 than other groups. Proportion of full (combination of all patterns) type edema were higher in group 3 than the other two groups. In group 1, proportion of sponge-like diffuse retinal thickening type was higher and cystoid macular edema type was lower than the other groups.
Conclusions The degree of diabetic control and morphologic subtypes with OCT should be considered to better predict the prognosis after treatment in DME.

• F091

Incidence of retinal vein occlusions (RVO) in patients treated with oral anticoagulants or antiplatelet drugs for cardioembolic or atherothrombotic prevention

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Purpose It is still a matter of debate whether anticoagulant or antiplatelet therapy are useful for the prevention of retinal vein occlusions. In some cases, patients who are already under antiplatelet or anticoagulant therapy still develop retinal venous diseases. We analyzed the prevalence of RVO in patients treated yet with warfarin or aspirin for other clinical indications.
Methods 64 patients (30 CRVO and 34 BRVO) treated with warfarin for atrial fibrillation (n=11) or aspirin for carotid stenosis (n=53) were observed. Multivariate analysis was employed to detect any putative relation among treatments and CRVO or BRVO.
Results The whole cohort analysis showed that aspirin was less effective than warfarin for prevention of RVO (H.R. 2.4, 95% C.I. 1.9-3.2 p< 0.01); 9 BRVO and 2 CRVO were in patients treated with warfarin whereas 25 BRVO and 28 CRVO in aspirin treated subjects. The confirmation test showed an H.R. of 2.1 (1.6-3.1 95% C.I.) p< 0.01, for the association between aspirin treatment and CRVO.
Conclusions Such retrospective data indicate that aspirin could be less effective in RVO and particularly CRVO prevention with respect to anticoagulants. Planned large prospective observational studies are needed to study the efficacy of such treatments in RVO prevention and treatment. Our data could fit well with the previous observation that specific pro-coagulative state as suggested by increased thrombin generation is a pattern of CRVO with respect to BRVO.

• F092

Analysis of SD-OCT prognostic factors in macular edema associated with retinal vein occlusion

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Purpose To identify quantitative and qualitative spectral-domain optical coherence tomography (SD-OCT) prognostic factors for visual outcome in patients with macular edema secondary to retinal vein occlusion.
Methods Fourty one patients (41eyes) with retinal vein occlusion were retrospectively analyzed with SD-OCT before and after resolution of macular edema. We evaluated the influence of these patterns on visual acuity: central macular thickness, total macular volume (TMV), continuity of the junction between photoreceptor inner and outer segments (IS/OS), of the external limiting membrane (ELM) and of the internal limiting membrane (ILM), and the number of hyperreflective foci.
Results The logMAR VA was significantly better in eyes with continuous IS/OS line, ELM and ILM (P<.001) and in eyes with a lower number of hyperreflective foci (p=0.032). Visual acuity was also statistically better in patients with a thinner central retinal thickness (P=0.046) and a less total macular volume (P=0.023) in patients with BRVO.
Conclusions SD-OCT seems to be helpful in predicting visual outcomes in macular edema associated with retinal vein occlusion and shows that outer layers integrity was closely associated with visual prognosis.

• F093

Correlation of foveal bulge on SD-OCT and visual acuity in resolved macular edema associated with branch retinal vein occlusion

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Purpose To investigate the correlation between the presence of a bulge in the photoreceptor inner segment/outer segment (IS/OS) line and the best corrected visual acuity (BCVA) in eyes with resolved macular edema associated with branch retinal vein occlusion (BRVO).
Methods A total of 17 eyes (17 patients) with macular edema associated with BRVO were evaluated. The medical records of patients who had a complete resolution of macular edema with intact IS/OS line in the central fovea on spectral-domain optical coherence tomography (SD-OCT) images were retrospectively reviewed. These eyes were classified into those with foveal bulge and those without foveal bulge and the characteristics of the 2 groups were compared.
Results Twelve eyes (70.5%) had complete resolution of macular edema after a mean follow up of 24.1 months. A foveal bulge was present in 9 of 17 eyes with resolved macular edema. The BCVA was significantly better in eyes with a foveal bulge than in eyes without foveal bulge (P <0.001). All eyes with foveal bulge had a decimal BCVA less than 0.5 against only 28.6% in eyes without foveal bulge (P = 0.011).
Conclusions Foveal bulge seems to be frequent in resolved macular edema associated with BRVO. Visual acuity was significantly better in the subgroup with foveal bulge making it a potential good marker of the functional properties of the fovea.

• F094

Electric shock-induced retinal vein occlusion: a propos of two cases

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Purpose Ocular damage after electric injury is a rare complication. The most commonly described damages are cataract, papillitis, and more rarely vascular complications. Optic nerve and retina have a low resistance, what can lead easily to their damage, affected by ischemia resulting from coagulation and necrosis from vascular structures.
Methods We report two cases of middle aged, otherwise healthy men, who suffered an episode of retinal vein occlusion, both occurring following a low-voltage shock. Both patients came to the Emergency department complaining a decreased visual acuity without any systemic damage due to the electric injury.
Results Both patients were diagnosed of a retinal vein occlusion and underwent intravitreal therapy with corticosteroids and antiangiogenic drugs. They were followed for 4 and 5 years and kept a visual acuity of 0.2 and 0.8, respectively.
Conclusions Ophthalmologists should be aware of an infrequent complication such as retinal vein occlusion when receiving a patient who has suffered an electric injury.

• F095

Treatment outcome of switching from ranibizumab to aflibercept in patients with central retinal vein occlusion

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Purpose To describe the outcome of switching from ranibizumab to aflibercept intravitreal injections in patients with macular oedema secondary to central retinal vein occlusion (CRVO).
Methods A prospective observational study was conducted in a tertiary retina service in East Midlands, UK. Twenty one patients with CRVO and associated macular oedema were reviewed. All patients had a detailed systemic and ocular history obtained and a thorough ocular examination including visual acuity assessment, intraocular pressure measurement and dilated fundus examination. Best-corrected visual acuity (BCVA) and central retinal thickness (CRT) were recorded at the initial and all following visits. Non-responders were defined as patients who despite a minimum of 3 consecutive ranibizumab injections at 4 to 6 weeks intervals had persistent intraretinal fluid one month after the last injection. These patients were switched to aflibercept. BCVA and CRT were measured before and after switching.
Results Twenty-two eyes of 21 patients with refractory macular oedema secondary to CRVO were included. All eyes had a mean 4.5 ranibizumab intravitreal injections after a mean period of 6 months without reduction of intraretinal fluid and/or no visual acuity gain. In these cases, a treatment change to aflibercept injections on a per-needed basis was decided. A significant decrease of mean CRT from 631 μm to 285 μm and improvement in mean BCVA from 1.3 logMAR to 1.0 logMAR was noticed. The mean number of aflibercept injections needed for oedema resolution was 2.
Conclusions Aflibercept is an efficient alternative treatment for macular oedema secondary to CRVO refractory to ranibizumab. Good anatomic and functional result can be achieved with few injections. The maintenance of these results after six months is yet to be investigated.

• F096

Relationship between visual outcomes and initial optical coherence tomographic findings in macular edema secondary to branch retinal vein occlusion after bevacizumab treatment

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Purpose To investigate the relationship between initial spectral-domain optical coherence tomographic(SD-OCT) features in macular edema (ME) secondary to branch retinal vein occlusion(BRVO) and visual acuity(VA) at 1 year after intravitreal bevacizumab(IVB) treatment.
Methods Patients diagnosed with ME secondary to BRVO and treated with IVB with 1 year follow up time were reviewed retrospectively. The presence of diffuse ME, cystic ME, disruption of the photoreceptor IS/OS junction(IS/OS disruption), serous retinal detachment(SRD) and epiretinal membrane(ERM) was evaluated and, central macular thickness(CMT), maximal central retinal height(MCRT) and sum of maximal retinal heights in five lines (5-sum) were measured on initial SD-OCT images. The patients were divided into two group; improved in visual acuity at 1 year after treatment(Group 1) and not improved(Group 2). Statistical analysis was done to evaluate the relationship between OCT findings and group division.
Results 49 patients(49 eyes) was enrolled in this study. 27 patients were in Group 1, 22 patients were in group 2. There was no significant difference of sex ratio, age and mean VA at initial visit between Group 1 and 2. It was found that the risk of being included in Group 2 increased approximately 5-fold in the presence of diffuse ME, but IS/OS disruption, SRD, and ERM did not show a statistically significant relationship with improvement in VA. Initial VA and 5-sum were significantly correlated with final VA. However, age, CMT, and MCRT had no statistically significance with final VA.
Conclusions This study suggests that initial SD-OCT findings and the measurements of patients with ME secondary to BRVO can be useful for predicting the visual outcome after IVB treatment. Initial VA, presence of diffuse ME and sum of maximal retinal heights in five lines were related with visual outcome.

• F097

Characteristics of retinal vein occlusion (RVO) patients with macular edema who lasted remission more than 6 months after single injection of intravitreal bevacizumab.

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Purpose To evaluate clinical characteristics of retinal veiin occlusion(RVO) patients with macular edema who lasted remission more than 6 months after single injection of intravitreal bevacizumab.
Methods We retrospectively reviewed sixty eight eyes of 67 patients who have macular edema due to RVO. Group 1 included eyes lasted remission more than 6 months after single injection of intravitreal bevacizumab.Group 2 included eyes lasted macular edema even after two injections of intravitreal bevacizumab and needed intravitreal triamcinolone or ozurdex. Clinical characteristics including initial visual acuity, initial CMT(Central macular thickness) were compared between two groups.
Results 44, 24, eyes were included in group 1, 2 respectively. Group 1 included 36 eyes of BRVO and 8 eyes of CRVO. Group 2 included 11 eyes of BRVO and 13 eyes of CRVO. Initial visual acuity was better in group 1 than group 2 (P=0.023). Initial CMT was higher in group 2 (P=0.006). Prevalence rate of diabetes were higher in group 2 (P=0.002).
Conclusions Our results suggest that weather the patient have a diabetes and initial visual acuity and CMT can be helpful in predicting the treatment response after intravitreal bevacizumab injection in these patients.

• F098

The 1 year outcome of intravitreal dexamethasone implant for macular edema secondary to central retinal vein occlusion

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Purpose To evaluate 1-year outcome of intravitreal dexamethasone implant in macular edema secondary to central retinal vein occlusion (CRVO).
Methods A medical records was reviewed retrospectively for 22 patients (22 eyes) with macular edema secondary to central retinal vein occlusion. All of them were treated with intravitreal dexamethasone implant twice a year and followed up at least 1-year from the first dexamethasone implant injection. The best-corrected visual acuity (BCVA), central macular thickness (CMT) and intraocular pressure(IOP) was measured at every 2 months after the first injection. Adverse effects including cataract formation, elevation of IOP were analyzed.
Results Mean age was 64.3±9.5. Mean injection number was 2.4 ± 0.6 and interval between first and second injection was 22.0 ± 6.4 weeks. Additional treatments were performed with 11 patients (50%), bevacizumab in 9 and triamcinolone acetonide in 2. Mean BCVA(logMAR) was 0.79 ± 0.49 at pre-injection and 0.72 ± 0.62 at 1 year. BCVA change was not significant (p=0.638). But there was significant BCVA increase at 2, 4, 6 month after first injection(p<0.001). The number of patients who improved in BCVA was 10 (45.5%) at 1 year. Mean CMT at baseline was 627.3 ± 149.7μm and 458.4 ± 139.0μm at 1 year, significant decrease compared to baseline (p<0.001). In subgroup analysis, Hypertension(HTN) group showed significant improvement in BCVA and CMT compared to non-HTN group (p=0.044; BCVA, p=0.005; CMT). Ischemic group represented significant decrease at CMT (p<0.001). Elevated intraocular pressure was observed in 6 eyes(27.3%). Cataract formation was in 3 eyes(13.6%).
Conclusions Intravitreal dexamethasone implant was effective in stabilizing visual acuity and reduction of macular edema in patients with macular edema secondary to central retinal vein occlusion.

• F099

long-term prognosis of visual acuity in eyes with retinal pigments epithelial tears

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Purpose To evaluate the long-term prognosis of visual acuity in the eyes with retinal pigment epithelial (RPE) tears treated with anti-vascular endothelial growth factor (VEGF) repeatedly.
Methods Six eyes of 4 patients diagnosed with RPE tear were studied retrospectively. All the patients were followed up at least for 24 months. If there was evidence of active leaking from choroidal neovascular membrane despite RPE tear, anti-VEGF injection was done repeatedly at the discretion of ophthalmologists.
Results The mean visual acuity was 20/500 in the break of RPE tear, and the final visual acuity was 20/200. Foveal involvement of RPE tear was the most important factor of the final visual acuity. Four eye with RPE tears involved foveola, although final visual acuity remained more than 20/200 in the two eyes. Anti-VEGF injection varied from zero to 19. More anti-VEGF injection was associated with the better final visual acuity.
Conclusions In our study, RPE tear did not suggest poor visual acuity in the long-term follow up known to be different. Active anti-VEGF injection might be needed to improve visual acuity in the long term follow up.

• F100

Changes in choroidal thickness after ranibizumab and aflibercept Therapy for treatment-naïve wet age-related macular degeneration

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Purpose To compare the changes in subfoveal choroidal thickness between ranibizumab and aflibercept therapy for treatment-naive wet age- related macular degeneration.
Methods This retrospective, observational study included 47 eyes of treatment-naive wet age-related macular degeneration patients who were followed up for at least 6 months after initial injection. All eyes were treated with 3 consecutive monthly injection of ranibizumab or aflibercpt, and treated with PRN injection of anti-vascular endothelial growth factor after 3 consecutive monthly injection. Subfoval choroidal thickness was measured using enhanced depth imaging optical chorence tomography.
Results In the ranibizumab injected group (25 eyes), mean changes in choroidal thickness was -9.80 μm, -16,86 μm, -25.08 μm, -10.40 μm at 1 month, 2 months ,3 months, 6 months after initial injection respectively. In the aflibercept injection group (22 eyes), mean changes in choroidal thickness was -24.30 μm, -32.73 μm, -37. 52 μm, -15.77 μm at 1 month, 2 months ,3 months, 6 months after initial injection respectively. The mean changes in subfoveal choroidal thickness was significantly greater in the aflibercept injected group ($p < 0.05$) at 1 month, but there was no significant difference between two group at 2 months, 3 months, and 6 months after initial injection. ($p > 0.05$)
Conclusions Subfoveal choroidal thickness was decreased after ranibizumab and aflibercept therapy. The mean changes in subfoveal choroidal thickenss was greater in aflibercept injected group at 1 month, but there was no significant difference between two therapy at 2 months, 3 months, and 6 months after initial injection.

• F101

Impact of intravitreous bevacizumab injections on perceived quality of life in a cohort of patients with exudative age related macular degeneration. Real life results at 4 years

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Purpose To examine the relationship between visual acuity, number of injections performed and Quality of Life (QoL) outcomes in patients with exudative age related macular degeneration (AMD) treated by intravitreal bevacizumab.
Methods Single centre, prospective study. This is a prospective study that was performed on 59 patients treated by intravitreal bevacizumab for exudative AMD on a treat and extend regime during four years in real life conditions at a public university hospital. Patients were evaluated by best-corrected visual acuity (BCVA) using early treatment diabetic retinopathy study (ETDRS) charts, posterior biomicroscopy, and spectral domain optical coherence tomography (SDOCT). In order to evaluate perceived visual quality of life the Visual Functioning Questionnaire-25 (NEI-VFQ25) was used prior to any visual test at baseline, at month 6, at month 12 and at month 48.
Results Twenty patients completed the 4 year follow-up. Mean age at baseline was 78 years (range 55 to 88). At baseline 11 patients showed bilateral disease (16 patients at month 48). The average number of injections performed was 12 (range 0-48). The average number of ETDRS letters read at baseline was 50.6 (range 1-85, SD 27.3) vs. 49.4 (range 1-82, SD 26.0) by the end of the 48-month period. The average values in NEI-VFQ25 in Health and Vision items and those related to Difficulty with Activities were 2.9 and 3 at baseline and at 48 months. The average value in Response to Vision Problems items decreased from 4 to 3.
Conclusions CONCLUSIONS: A mild decrease in BCVA was associated with a similar decrease in the perceived quality of life determined by NEI-VFQ25 in patients with exudative AMD treated by intravitreal bevacizumab after four years treatment on a treat and extend regime.

• F102

Prevalence and incidence of epimacular membranes in patients with wet AMD

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Purpose The purpose of this study was to report the prevalence of epimacular membranes (ERM) in a population followed for age-related macular degeneration (AMD) and to assess their incidence of onset over time.
Methods Multicentric study of the EAST group (Eastern French Studies and Trial Group) (3 sites: Besancon, Nancy, Strasbourg) from the Vitreo-macular interface in the Age-related macular degeneration study (EVA study). All patients had consecutive control visits with Spectral-Domain OCT (Spectralis, Heidelberg Engineering, Heidelberg, Germany). The OCT protocol consisted of the acquisition of horizontal cross-sectional scans passing through the fovea and 3 and 6 mm of either side. The vitreomacular interface has been described according with the IVTS nomenclature.
Results 312 patients with one or both eyes treated for wet AMD (410 eyes) were studied. The average age was 80 years (55-96y). The mean follow-up was 30 months (2.9-110). 17.3 % of eyes treated displayed an ERM at baseline and 18.8% at the end of follow-up. During follow-up, 13 eyes treated (3.2%) have developed ERM. 18% of eyes in the wet AMD group displayed an ERM against 10% of the eyes in the control group (190 fellow controled eyes), (OR=2,08 CI95%=1.22-3.49). Final visual acuity (VA) was significantly lower in patients with ERM ($p<0.01$) with an average of 44.3 ETDRS letters against 52.6 in patients without ERM. The average number of IVI in patients with ERM was not significantly higher ($p> 0.05$). 17 patients (4.1%) with ERM underwent vitreoretinal surgery, with an average gain of 8.3 ± 18.4 letters.
Conclusions Epiretinal membranes are frequent in patients treated for wet AMD and are associated with a lower VA. Nevertheless, they do not imply a higher need of injections. A study to assess the benefit of ERM surgery in patients with AMD is currently conducted.

• F103

Spontaneous anatomical improvement on OCT findings in patients with neovascular age-related macular degeneration without anti-VEGF treatment.

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Purpose To present some patients with wet AMD can be improved spontaneously on OCT findings without anti-VEGF treatment.
Methods We reviewed the medical records of wet AMD patients visiting Gangneung Asan Hospital from December 2013 to May 2015. There were group of patients who refused to receive anti-VEGF treatment due to various reasons, even though there were remaining subretinal fluid and/or pigment epithelial detachment on OCT. Among those patients, we investigated spontaneous anatomical improvement cases without anti-VEGF injection.
Results There were nine cases showing spontaneous anatomical improvement on OCT findings. Average age was 70.0±9.4, male was seven, and female was two. Number of anti-VEGF injection was 4.4±1.7, and injection-free interval was 12±5.7 months before showing spontaneous anatomical improvement on OCT. Seven cases showed resolution of subretinal fluid, and two cases showed decrease of pigment epithelial detachment size. Initial visual acuity was 0.64±0.36 in LogMAR scale, and final visual acuity improved to 0.40±0.28 in LogMAR scale. Six patients were treated with bevacizumab, two patients received aflibercept, and one patient was injected with ranibizumab. Total follow up periods was 21.0±5.3 months. During the periods, three cases worsened and re-treatment was performed with anti-VEGF agents. Six patients have not shown recurrence for more than 6 months. Those nine patients showed relatively small number of anti-VEGF injection and improvement of visual acuity.
Conclusions These findings might imply that some patients showing small amount of remaining SRF and/or PED might not need frequent anti-VEGF injection, especially in patients showing good response to anti-VEGF therapy with relatively good initial visual acuity. And closed follow up will be essential and needed for those patients.

• F104

Comparison between Aflibercept, Ranibizumab intravitreal injection on Neovascular Age-related macular degeneration patients

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Purpose To investigate the difference of optical coherence tomography(OCT) findings between aflibercept treatment group and ranibizumab treatment group.
Methods This study include 63 patients(n= 63 eyes) diagnosed with treatment-naïve neovascular AMD, and they were treated with aflibercept or ranibizumab monthly for 3 months. We compared the changes of the two groups between before the treatment and after the treatment with optical coherence tomography(OCT) findings such as serous pigment epithelium detachment, fibrovascular pigment epithelium detachment, subretinal fluid, intraretinal fluid, dense zone of outer retina, classic neovascularization, and hyper-reflective dots. And we also compared the changes of BCVA and IS/OS length, ELM length, central foveal thickness with optical OCT between the two groups.
Results There were no significant differences between two groups before each treatments. Serous pigment epithelium detachments were disappeared 36% in aflibercept group, 5% in ranibizumab group, and there was significant difference between the two groups(p=0.021). There was no significant changes such as BCVA change, OCT finding changes except for serous pigment epithelium detachment between the two groups.
Conclusions For treatment of neovascular AMD patients, aflibercept might be more effective in serous pigment epithelium detachment than ranibizumab. Because there was no significant visual acuity improvement in serous pigment detachment improvement group in both two treatments, it might be necessary to study further about relationship between visual acuity and serous pigment detachment improvement.

• F105

Licence to save - A UK survey of anti-VEGF use for the eye in 2015

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Purpose The difference in cost of Anti-vascular endothelial growth factor (anti-VEGF) injections is significant. Prices, according to the British National Formulary (BNF), are: ranibizumab; £742 per single injection vial, aflibercept; £816 per single injection vial, and bevacizumab £242.66, but in standard practice each vial is divided into 20 injections, giving a price of £12.13 per injection. Because patients require repeated injections these costs are multiplied many times over.
We hypothesised the majority of injections would be with the less expensive drug, bevacizumab. We therefore performed a survey of all United Kingdom (UK) NHS ophthalmological units.
Methods A freedom of information (FOI) request was submitted to all UK NHS Trusts and Health Boards requesting the number and cost of intravitreal injections of ranibizumab, aflibercept, and bevacizumab prescribed during the month of January 2015.
Non-NHS units were excluded.
Costs per month were determined by multiplying injection numbers with BNF (British National Formulary) prices and then by 12 for yearly costs.
Results A total of 189 FOI requests were sent. The overall response rate was 95.8%
Ranibizumab was used 30634 times (61%), Aflibercept 18095 (36%) and Avastin was only 1410 (3%)
Costs per month were: £27,276,514 for Ranibizumab, £17,683,373 for Aflibercept, £20,530 for Bevacizumab.
Total monthly costs were: £44,980,416.00. Estimated annual costs were: £539,764,992.00
Conclusions These results show the anti-VEGF injection cost to the NHS. Contrary to hypothesis the vast majority (97%) were still with the more expensive drugs ranibizumab and aflibercept. If all injections used divided bevacizumab, the estimated drug cost would be £ 607,749 (£ 729,500 incl. VAT) saving the NHS £ 449,196,354 (£ 539,035,492 incl. VAT) per year. With 5% remaining unaccounted for the savings may be greater.

• F106

The long-term effect of intravitreal bevacizumab injection in central serous chorioretinopathy

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Purpose To study the effect of intravitreal bevacizumab injection in patients with idiopathic central serous chorioretinopathy.
Methods We had performed retrospective review on the patients who had been diagnosed as idiopathic central serous chorioretinopathy and had regular follow-up for at least 12 months from the first injection, either undergone intravitreal bevacizumab injection (107 eyes of 100 patients) or observed without injection (46 eyes of 40 patients). Changes in the visual acuity and the serous neurosensory retinal and retinal pigment epithelium detachment were evaluated through the results of best corrected visual acuity and optical coherence tomography measured at initial presentation, after 1month, 3months, 6months, 9months and 12months of the first injection.
Results 87 males and 13 females with mean age of 45.4±7.6 years were recruited in the intravitreal bevacizumab injection (IVB) group, and 34 males and 6 females with mean age of 47.2±9.8 years were recruited in the observation group. There was significant difference in the mean duration of retinal detachment to disappear between the IVB group (2.5±0.2 months) and the observation group (4.3±0.7 months). There was no significant difference in the best corrected visual acuity and the central macular thickness after 12 months follow-up between the IVB group and the observation group.
Conclusions Intravitreal bevacizumab injection was more effective and faster treatment for resolution of sensory retinal detachment than observation during the 12 months of consecutive follow-up. Therefore, intravitreal bevacizumab injection can be considered as a significant and safe treatment modality for central serous chorioretinopathy when the patients need prompt visual improvement, such as depending on the morbid eye or requiring binocular vision for occupational cause.

• F107

Spironolactone in the treatment of nonresolving central serous chorioretinopathy: A comparative analysis

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Purpose To evaluate the effect of spironolactone, a mineralocorticoid receptor antagonist, for naïve and nonresolving central serous chorioretinopathy.
Methods A retrospective chart review was conducted of all central serous chorioretinopathy patients at one center treated with spironolactone (50 mg once a day) or observation. Thirty eyes of 30 patients with central serous chorioretinopathy and persistent subretinal fluid (SRF) for at least 8 weeks were enrolled. Patients were followed at monthly intervals with examination and optical coherence tomography. The primary outcome measure was the changes in SRF thickness from baseline to the apex of the serous retinal detachment. Secondary outcome included the best-corrected visual acuity (BCVA).
Results The mean duration of central serous chorioretinopathy before enrollment in study eyes was 11.13 ±2.40 weeks. Spironolactone demonstrated statistically significant visual acuity improvement (0.12 ± 0.09) and SRF reduction (273.07 ± 71.16 μm) at 3 months compared to baseline (0.25 ± 0.17, P=0.003 ; 432.57 ± 108.99 μm, P=0.001, respectively). Eight of the 14 patients with spironolactone had complete resolution of SRF at 3 months, compared to six of the 16 patients under observation (P=0.377). Data analysis showed a statistically significant improvement in SRF and visual acuity in spironolactone treated eyes as compared with the same eyes under observation (P=0.043, P=0.047, respectively). There were no complications related to treatment observed.
Conclusions In naïve eyes with persistent SRF due to central serous chorioretinopathy, spironolactone had a positive effect in the reduction of SRF and recovery of visual acuity.

• F108

Retinal microangiopathy as primary manifestation of systemic lupus erythematosus

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Purpose Systemic lupus erythematosus (SLE) is a complex connective tissue disorder that involves multiple organs, including several ophthalmic structures. The prevalence of retinopathy ranges from 3% to 29% and the autoimmune process affects the retina in two ways, directly by deposition of immune complexes and indirectly by arterial hypertension secondary to renal involvement. Although uncommon, ocular manifestations can precede systemic features, and their early diagnosis is the key to successful and better prognosis.
Methods We present a case of retinal microangiopathy as primary manifestation of systemic lupus erythematosus (SLE). The patient is a 37-years old woman, who presented at the Emergency department with a 24-hours history of floaters in her right eye (RE). Systemic review revealed arthralgias for the past 6 months. Best-corrected visual acuity (BCVA) was 20/20 in both eyes. Pupillary reflexes, slit-lamp biomicroscopy examination and Goldmann applanation intraocular pressure (IOP) were normal. Fundus examination showed bilateral dot haemorrhages and cotton wool spots. Spectral-domain optical coherence tomography (SD-OCT) and fluorescein angiography were also normal.
Results Blood investigations revealed anemia, leucopenia and thrombocytopenia, without any affectation of renal function. Based on the clinical findings and serology results, a diagnosis of SLE was made. The patient was treated with intravenous methylprednisolone followed by oral prednisolone which was then gradually tapered. Retinal signs resolved two months following treatment.
Conclusions This case illustrates that retinopathy can be a primary presenting manifestation in a SLE patient who is apparently healthy.

• F109

Ophthalmic findings before carotid endarterectomy in the ipsilateral and contralateral eye

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Purpose To assess ophthalmic findings of ipsilateral (IL) and contralateral (CL) eyes of 30 first patients undergoing endarterectomy for carotid artery disease in Helsinki Carotid Endarterectomy Study 2- Substudy (HeCES-BEST) (inclusion criteria ≥70% occlusion, exclusion criteria unable to undergo neuropsychological tests or MRI)
Methods Best corrected visual acuity (BCVA) with ETDRS chart at 4 meters, anterior and posterior segment biomicroscopy, and 30°/50°/200° fundus photography. Differences in proportions of quantitative variables assessed with Fisher's test.
Results Of 30 patients (one female) with median age 68 y (range 53-91), eleven had experienced ocular ischemic attack, and one sudden visual loss and pain (40%). Three patients had had surgery of the CI side. All but two IL eyes had full BCVA, one with neovascular glaucoma (NVG) 0.16 and one with unrelated scar 0.63; all CL eyes had full BCVA. No corneal changes related to ischemia were found. Conjunctival and/or episcleral vessels were dilated in nine IL and two CL eyes (P=0.042), including varicose-like vessels. Iris transillumination in pupillary border was found in 17 IL and 12 CL eyes (P=NS). Rubeosis iridis occurred in two IL eyes (P=NS). Arteriolosclerotic changes (nickings) were found in all. Retinopathy: microaneyrysms, microinfarctations and hemorrhages were found in nine IL and one CL eye (P=0.012), midperipheral hemorrhages in four IL eyes and Hollenhorst's plaque in one CL eye. Venous pulsation was undetectable and uninducible in nine IL and five CL eyes (P=NS), and arterial pulsation induceable in 5 IL and two CL eyes (P=NS); no spontaneous arterial pulsation detected. NVG occurred in one IL eye
Conclusions Vision disturbance and signs of ischemia are not uncommon underlining the role of ophthalmologists in suspicion of carotid artery disease.

• F110

Short-term efficacy of intravitreal aflibercept depending on subtypes of polypoidal choroidal vasculopathy: polypoidal choroidal neovascularization or idiopathic choroidal vasculopathy

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Purpose To compare the short-term efficacy of intravitreal aflibercept treatment for polypoidal choroidal neovascularization (CNV) and idiopathic polypoidal choroidal vasculopathy (PCV).
Methods Twenty-nine patients (29 eyes) with treatment-naïve subfoveal PCV were consecutively enrolled in this institutional study. The subjects were classified into two subtypes (type 1, polypoidal CNV, 16 eyes; and type 2, idiopathic PCV, 13 eyes) based on the presence or absence of both feeder and draining vessels on indocyanine green angiograph. Intravitreal aflibercept was administered at baseline and at 1, 2, and 4 months. The primary outcome was the polyp regression percentage after 3 monthly injections. Changes in the best-corrected visual acuity and subfoveal choroidal thickness (CT) were evaluated at 3 and 6 months
Results The complete polyp regression percentage was higher in type 1 than type 2 patients after 3 monthly injections (81% versus 30%, respectively; $P = 0.008$). Type 1 patients showed better visual improvement at 3 months than type 2 patients (−0.34 versus −0.08 logarithm of the minimum angle of resolution [logMAR], respectively; $P = 0.050$). Although subfoveal CT was significantly decreased after injections in both groups, type 2 patients with a thicker choroid at baseline showed a greater decrease than type 1 patients (−43.5 μm versus −19.6 μm, respectively; $P = 0.032$) at 3 months.
Conclusions There was a difference in early treatment response with aflibercept between two subtypes of PCV. Type 1 polypoidal CNV showed better visual improvement with a higher percentage of polyp regression than type 2 idiopathic PCV.

• F111

Vitreous and serum Hsp 70 levels in rhegmatogenous retinal detachment

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Purpose Heat shock proteins (Hsp) are ubiquitous proteins that protect cells from different kinds of stress. Retinal detachment (RD) is a critical eye situation after that death of photoreceptors by apoptosis and necrosis occurs. Despite the best anatomical result following the surgery visual acuity may not improve. The objective of the present study was to detect possible correlations of Hsp 70 levels between vitreous and serum of the patients with RD.
Methods Totally 15 eyes of 15 patients were included. The study group consisted of 11eyes with rhegmatogenous RD and the control group consisted of 4 eyes with macular hole or epiretinal membrane without RD. All eyes underwent pars plana vitrectomy. Vitreous and serum samples were obtained at the time of vitrectomy. The levels of Hsp 70 were analyzed using Enzyme linked immuno-sorbent assay. Total vitreous proteins and total serum proteins were also measured. Mann-Whitney U and Spearman correlation tests were performed for the statistics. The significance was set to < 0.05.
Results In sum total (n=15),higher mean vitreous Hsp 70 level (±standard deviation) were detected in eyes than that of serum (184.41 ± 154.4 pg/mL ***vs.*** 85.43 ± 27.47 pg/mL, P<0.001).In the study group, vitreous Hsp 70 levels are higher than those of serum (209.33 ± 175.12 pg/mL ***vs***. 83.95 ± 26.95 pg/mL, P< 0.001) as well as serum and vitreous Hsp 70 levels were not correlated (P>0.05). In the control group, serum and vitreous Hsp 70 levels were similar (89.49 ± 32.72 pg/mL ***vs.*** 115.87 ± 22.05 pg/mL, P>0.05), and serum and vitreous Hsp 70 levels were not correlated (P>0.05).
Conclusions Elevated vitreous Hsp 70 levels in the eyes with rhegmatogenous RD could be due to increased endogenous synthesis to prevent stressed retina from apoptosis.
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• F112

Assessment of choroidal thickness and retinal nerve fiber layer thickness before and after G training using swept-source optical coherence tomography

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Purpose To evaluate changes in choroidal thickness before and after gravity resistance training (GRT) by using swept-source optical coherence tomography (SS-OCT, Topcon, Tokyo, Japan) data with automated segmentation software.
Methods The eyes of 14 healthy volunteers who planned to do gravity resistance training enrolled this study. A three-dimensional wide scanning protocol with SS-OCT examination was done at baseline, immediately after gravity resistance training and 15, 30 and 60 min after gravity resistance training. Refractive error and axial length measurement was also done.
Results Mean choroidal thickness significantly and transiently decreased immediately (246.22 ± 64.98 μm, p<0.001), 15 min (244.65 ± 62.88 μm, p=0.001) and 30 min (243.08 ± 61.45, p=0.001) after GRT, relative to baseline (251.18 ± 63.12 μm). However, decreased choroidal thickness was increased 1 hour after GRT (256.51±9.20 μm, p=0.437). Choroidal volume was also transiently decreased after GRT. Mean retinal thickness and retinal nerve fiber layer thickness were not changed after GRT.
Conclusions Choroidal thickness significantly but transiently decreased after GRT, which meant choroidal perfusion was transiently decreased. Therefore, the effect of high gravity exposure to choroidal circulation over long period time must be further evaluated.

• F113

Itraconazole inhibits laser-induced choroidal neovascularization in rats by suppressing VEGFR2 expression

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Purpose To demonstrate the anti-angiogenic effect of itraconazole on laser-induced choroidal neovascularization (CNV) in rats.
Methods Six laser burns were induced in the peripapillary area of each eye of male Brown Norway rats (200–250 g) to cause CNV. Right eyes were administered intravitreal injections of 1 μg/10 μl itraconazole; left eyes received 10 μl balanced salt solution (BSS) as controls. On day 14 after laser induction, fluorescein angiography (FA) was used to assess abnormal vascular leakage. Flattened retinal pigment epithelium (RPE)-choroid tissue complex was stained with Alexa Fluor 488-conjugated isolectin B4 to measure the CNV area with an image analysis program. Vascular endothelial growth factor receptor 2 (VEGFR2) mRNA and protein expression were determined by quantitative RT-PCR or Western blot.
Results Intravitreal itraconazole significantly reduced leakage from CNV as assessed by FA and CNV area on flat mounts of the RPE-choroid complex when compared with intravitreal BSS on day 14 after laser induction ($P = 0.002$ for CNV leakage, $P < 0.001$ for CNV area). Quantitative RT-PCR showed significantly lower expression of VEGFR2 mRNA in RPE-choroid complexes from itraconazole-injected eyes than from BSS-injected eyes ($P < 0.001$). Western blots indicated that VEGFR2 was downregulated after 14 days of itraconazole treatment.
Conclusions Our study demonstrated that intravitreal itraconazole significantly inhibited the development of laser-induced CNV in rats. Itraconazole had anti-angiogenic activity by reducing VEGFR2 expression. Itraconazole may prove beneficial for treating CNV as an alternative or adjunct to other therapies.

• F114

A case of bilateral central serous chorioretinopathy secondary to Cobimetinib treatment.

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Purpose On November 2015,Cobimetinib(Cotellic®) was approved for usingin combination with Vemurafenib to treat adult patients with unresectable or metastatic melanoma with a BRAF V600 mutation. We report a case of central serous chorioretinopathy (CSC) associated with Cobimetinib treatment.
Methods A 48-year-old male patient complained of a blurred spot in the center of vision in both eyes. The patient was diagnosed with metastatic melanoma and had begun the treatment with 60 mg of Cobimetinib two days before the symptoms appeared.
Results Best-corrected visual acuity (BCVA) was 20/20 bilaterally, slit-lamp examination and Goldmann applanation intraocular pressure (IOP) were normal. Funduscopy revealed a bilateral dome-shaped subretinal macular elevation on both eyes. Spectral-domain optical coherence tomography (SD-OCT) showed macular edema with retinal pigment epithelium (RPE) detachment in both eyes. Treatment was suspended and within 5 days macular morphology was normal. He started with a lower dose of Cobimetinib, 40 mg once daily, and a month later he is not presenting any retinal alteration.
Conclusions Although CSC is considered an idiopathic disease, it is really important to perform a thorough anamnesis and to look for the etiology, especially when it is a bilateral case like this one. In CSC secondary to Cobimetinib, it is really necessary to adjust the dose of the drug because CSC usually disappears. Leaving this therapy is not an option for many patients with unresectable or metastatic melanoma. SD-OCT could play an important role in the dose adjustment to avoid CSC in these patients. To the best of our knowledge this is the first case of bilateral CSC secondary to Cobimetinib treatment for metastatic melanoma.

• S001

Resvega induces autophagy and prevents ARPE-19 cell damage during proteasome inhibition

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Purpose Impaired autophagic and proteasomal cleansing has been documented in retinal pigment epithelial (RPE) cells and age-related macular degeneration (AMD) pathology. Omega fatty acids and resveratrol has been shown to be cytoprotective in RPE cells. We examined effects of commercial Resvega on the regulation of autophagy and cytoprotection in ARPE-19 cells under proteasome inhibition.
Methods Protein aggregation was induced with 1 mM MG-132 and autophagy was inhibited with bafilomycin A1. Resvega that includes vitamin C 240 mg, E 30 mg, zinc 12,5 mg, copper 1 mg, omega-3 665 mg, lutein 10 mg, zeaxanthin 2 mg and resveratrol 30 mg was used solely and together with proteasome inhibition up to 48 hours. p62 (SQSTM1), LC3 (microtubule-associated protein 1A/1B-light chain 3) and Hsp70 (Heat shock protein 70) were analyzed by Western blotting (WB). Tandem fluorescently tagged LC3 (GFP-mCherry-LC3) transfection was used to study autophagy flux in fluorescence microscopy.
Results Inhibition of proteasomes with MG-132 upregulated Hsp70, autophagy markers p62 and LC3 detected in WB. Simultaneous treatment with MG-132 and Resvega corresponding 25 µM resveratrol concentration highly increased amount of LC3-II, but decreased p62 and Hsp70. Moreover, Resvega provided a clear cytoprotection under proteasome inhibition. Fluorescence microscopy showed increased autophagy flux with GFP-mCherry-LC3 Resvega treatment and autophagy inhibition resulted accumulation of p62 and LC3-II.
Conclusions This data showed how Resvega was able to induce autophagy and clear protein waste caused by proteasome inhibition in ARPE-19 cell line. Resvega has a potential in the prevention and treatment of RPE damage and AMD.

• S002

Taking a roller coaster ride with autophagy markers p62 and LC3

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Purpose Lysosomal autophagy is crucial for the removal of dysfunctional proteins, aggregated cellular material and organelles. Post-mitotic cells, such as retinal pigment epithelial cells, are particularly susceptible to age-related aggregation-prone proteins. Excessive or defective activity of the autophagy leads to detrimental effects on RPE cell homeostasis. Therefore, autophagy must be controlled not only with positive but also with negative signals to retain homeostasis. In this work, autophagy markers LC3 (microtubule-associated protein 1A/1B-light chain 3) and p62 (SQSTM1) were monitored in ARPE-19 cell line.
Methods ARPE-19 cells were treated with autophagy inducers, proteasome inhibitor MG-132 and Resvega (contains resveratrol and omega-3 fatty acids), in normal and serum-starved growth conditions up to 48h. Protein samples from different time points were collected and the protein levels of LC3-II, LC3-I and p62 were analyzed with Western blot.
Results The levels of LC3-II, LC3-I and p62 fluctuated during the monitored time period in both growth conditions. The magnitude of the fluctuation was highest in the serum-starved samples at early time points and became weaker at the later time points. The expression levels of autophagy markers were constant throughout the experiment in normal growth conditions.
Conclusions This data showed that autophagy regulation is a dynamic process that coincides with changed and time dependent expression levels of LC3 and p62 in response to MG-132, Resvega and starvation. This should be noticed when autophagy data is analyzed.

• S003

Warfarin use among wet AMD patients

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Purpose To evaluate the prevalence of warfarin use among wet AMD patients, and impact on clinical outcome.
Methods A retrospective analysis of patient records was conducted in Kuopio University Hospital, Finland. We obtained best possible medication history of 414 wet AMD patients and 247 controls, aged 60 years or over, and already excluding other causes of macular oedema by ophthalmologist. Controls were patients with glaucoma or age-related cataract, with no wet AMD. Due missing medication history, 139 wet AMD patients and 71 controls (p=0.216) were kept out from the study. When possible, we obtained real-life 2-year outcome data of wet AMD treatment for the patient's first eye, solely treated with anti-VEGF ***pro re nata.***
Results The study included 276 wet AMD patients (mean age: 79.5 years) and 175 controls (mean age: 75.3 years). A positive warfarin medication history was detected in 57 (20.7%) wet AMD patients, compared to 16 (9.1%) in control group. Crude OR was 2.59 (95% CI 1.43-4.67, p=0.001). Age-adjusted OR was 1.92 (95% CI 1.02-3.60, p=0.018). Treatment outcome data was obtained from 11 patients (mean age: 77.3 years) using warfarin and 54 patients (mean age: 79.1 years) without warfarin medication. Snellen visual acuity didn't differ between these wet AMD groups at the baseline (0.3 vs. 0.2, p=0.319). After 2-year follow-up, no difference was seen in the change of visual acuity (+0.3 vs +0.3, p=0.696), or in number of anti-VEGF injections (7.8 vs 9.0, p=0.435) with respect to the use of warfarin.
Conclusions Our study suggest that warfarin use may be more common among wet AMD patients, but it does not have any effect on the outcome of wet AMD treatment. As the study sample is small and wet AMD-related cardiovascular factors are susceptible to interfere, these initial findings should be verified in a larger prospective study.

• S004

Melissa officials L. extracts protect human retinal pigment epithelial cells against oxidative stress-induced apoptosis.

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Purpose We evaluated the protective effect of ALS-L1023, an extract of Melissa officinalis L. (Labiatae; lemon balm) against oxidative stress-induced apoptosis in human retinal pigment epithelial cells (ARPE-19 cells).
Methods ARPE-19 cells were incubated with ALS-L1023 for 24 h and then treated with hydrogen peroxide (H2O2). Oxidative stress-induced apoptosis and intracellular generation of reactive oxygen species (ROS) were assessed by flow cytometry. Caspase-3/7 activation and cleaved poly ADP-ribose polymerase (PARP) were measured to investigate the protective role of ALS-L1023 against apoptosis. The protective effect of ALS-L1023 against oxidative stress through activation of the phosphatidylinositol 3-kinase/protein kinase B (PI3K/Akt) was evaluated by Western blot analysis.
Results ALS-L1023 clearly reduced H2O2-induced cell apoptosis and intracellular production of ROS. H2O2-induced oxidative stress increased caspase-3/7 activity and apoptotic PARP cleavage, which were significantly inhibited by ALS-L1023. Activation of the PI3K/Akt pathway was associated with the protective effect of ALS-L1023 on ARPE-19 cells.
Conclusions ALS-L1023 protected human RPE cells against oxidative damage. This suggests that ALS-L1023 has therapeutic potential for the prevention of dry age-related macular degeneration.

• S005

Possible association with obesity-related loci and outcome of wet AMD

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Purpose To investigate whether obesity-related genes affect a visual outcome of anti-VEGF-treatment in wet AMD.
Methods Thirty-seven patients with wet AMD (mean age: 77.0 years) in Kuopio University Hospital, Finland, solely treated with anti-VEGF as needed, were genotyped for 40 recently associated obesity-related loci using the Sequenom iPlex platform. Diabetes and other causes of macular oedema diagnosed by ophthalmologist were exclusion criteria. Obesity-loci were examined with respect to retrospective clinical monitoring data, including also visual acuity (VA) measured by Snellen decimals.
Results Visual outcome was associated with rs10938397 (GNPDA2), rs1555543 (PTBP2), and rs7359397 (SH2B1). Mean differences in VA between the two homotsygotes were 0.25 (p=0.03), 0.25 (p=0.002), and 0.26 (p=0.003), respectively. Genotypes did not differ by age, baseline VA, body mass index (BMI), gender, the number of anti-VEGF injections, smoking, or the use of dyslipidemia medication, expect for rs10938397 (mean BMI difference 3.2 kg/m2, p=0.38) and rs7359397 (mean age difference 8.5 years, p=0.14).
Conclusions Our data suggest, that at least rs1555543 (PTBP2) might have some effect on the visual outcome of anti-VEGF-treatment in wet AMD. The present study may be affected by the small sample, and it need to be replicated in a larger prospective setup. Diseases associated with PTBP2 include cancer-associated retinopathy. Nevertheless, the potential role of the abundant genetic variation in modifiying drug responses in wet AMD should be further investigated.

• S006

HuR/ELAVL1 expression in the human cataractous lens

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Purpose Cataract is a common age-related ocular disease having as major determinants oxidative stress, accumulation of protein aggregates and inflammation. It has been previously reported that the expression of the RNA-binding HuR/ELAVL1 (Embryonic Lethal Abnormal Vision-Like 1) protein, a master regulator of many cellular functions including cell stress response, is altered in various ocular disorders. Here we develop a method to assess, by means of several techniques, the expression of HuR/ELAVL1 in human lens.
Methods Human anterior lens capsules (aLCs) were collected from patients undergoing uneventful cataract surgery for mixed nuclear and cortical cataracts after informed consent was obtained. Control aLCs were obtained from non-cataractous lenses derived from human cadaver eyes removed within 24 hours of death. The samples collected were snap frozen for further processing. Quantitative real-time PCR, Western blotting and ELISA assay were used to determine the expression and distribution of HuR/ELAVL1 in the lenses.
Results HuR/ELAVL1 is expressed at both mRNA and protein level in the epithelial cells and aLC from age-related cataract patients and healthy subjects.
Conclusions This is the first study documenting the expression of HuR/ELAVL1 in human lens. Considering the importance of oxidative stress in the development of cataract, further experiments will allow to determine whether HuR/ELAVL1, which exerts in other ocular pathologies a post-transcriptional control of stress response genes, may play a role in cataract pathogenesis.

• S007

SMA+perivascular cells evaluation in VEGF induced blood-retinal barrier breakdown in rabbit model

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Purpose Diabetic Retinopathy (DR) is one of the hallmark microvascular diseases secondary to diabetes. Endothelial cells and perivascular cells are key players in the pathogenesis. It has been shown that VEGF coordinates interactions between endothelial and perivascular cells. In rodent studies, VEGF injected into the eyes results in vascular retinal permeability with pericyte loss. Immunochemistry used for quantification of perivascular cells is well described for murine species but not for rabbit. The aim of the present study was to evaluate perivascular cell pattern in rabbit induced retinal permeability model.
Methods Ten pigmented rabbits were induced by intravitreal injection of 500ng rhVEGF165 into the right eye. At day 2, quantification of vascular leakage was evaluated by fluorometry in both eyes. At day 3, both eye were sampled and fixed. Anti- SMA and Isolectin B4 staining was performed on flat-mounted retina. The evaluation of SMA+cells was performed along the microvasculature.
Results Area of SMA+cells decreased with distal progression along the arterioles and venules: from 78 % to 47 % of coverage for arteriolar tree and 69% to 47% for venular tree, less coverage for capillary (30%). Flat-mounted retina immunostaining analysis revealed that VEGF-induced treated eyes displayed a remodeling and a loss of the SMA+cells coverage in comparison with left non-induced eyes: Radial arteriole coverage decreased by 27% (A2) and 23% (A3) in VEGF-induced eye. Radial venular coverage decreased by 22% (V2) in VEGF-induced eye. No difference was observed on capillary vessel type with SMA immunolabelling.
Conclusions This study showed the SMA+cells coverage pattern of retinal microvasculature in rabbit eyes and indicates that VEGF decreased SMA+cells coverage of both arteriolar and venular tree in an induced blood-retinal barrier breakdown rabbit model.

• S008

Blepharospams treated with eyelid suspension : long terme follow up and outcomes

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Purpose Blepharospasm is defined as a located form of dystonia which is best medically treated with botulinum toxin injections.
Methods Our study concerned patients suffering from blepharospasm and operated of eyelid suspension because of botulinum toxin insufficiency, and their follow up over many years.
Results The mean time between blepharospasm diagnostic and surgery was 43,8 months. 76% of patients needed new toxin injections after a mean time of 3,5 months after surgery. A new surgery was performed because of late overcorrection for 28% of patients, with a mean time between the two surgeries of 64 months.
Compared with previous studies, our patients population was similar, the patient rate retreated with toxin was high but lower than the 100% generally described. The long terme re-operation rate was high in our study. This over-correction could be linked to a blepharospam decreasing intensity after a many years evolution.
Conclusions Most patients operated of eyelid suspension for blepharospasm need new botulinum toxin injections but some can be over-corrected in case of pathology relief after many years of progression.

• S009

Unexpected orbital swelling after injection of hydrogel self inflating expanders

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Purpose Hydrogel self-inflating expanders are used since the beginning of the century in order to treat enophalmos that occur after enucleation or evisceration. They are inserted in a dry, contracted state, and expand gradually to reach 10-fold increase in volume. This procedure is relatively simple and considered as safe. Short term complications are rarely reported. Aim: to report a case of orbital swelling after implantation in order to discuss differential diagnosis and treatment options and present a revue of literature.
Methods We describe the case of a 55 years old woman who received intra orbital injection of self-inflating expanders in order to treat post-enucleation enophtalmos. This procedure was followed by unexpected orbital swelling one day after surgery. The patient described important pain but no infectious signs were found.
Results Early CT scan showed intra orbital isodense mass which ruled out post operative bleedind. MRI allowed to find out oedema features in the mass on T2w-STIR images. It showed also the expanders inside the mass. The patient underwent topical and oral steroid medication during 3 months allowing complete resolution of the event. With no recurrence after 6 months follow up. After 6 months the swelling totally disappeared and MRI showed only the expanders with a high signal in T2w-STIR images.
Conclusions Non-infectious orbital swelling after hydrogel self-inflating expanders had not been previously described. Reporting adverse effects may help oculoplastic physicians improving the management of such rare cases

• S010

Surgical outcome of minimal resection with full thickness rotating suture technique for lower lid epiblepharon

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Purpose To introduce the minimal skin & orbicularis oculi muscle resection with full thickness rotating suture technique for lower lid epiblepharon and its surgical outcome.
Methods A retrospective review of The medical records was performed on lower lid epiblepharon patients who were followed for more than 6 month following surgical correction performed between January 2004 and December 2015 were retrospectively reviewed. All surgeries were performed by one surgeon using minimal skin & orbicularis oculi muscle resection and the full thickness rotating suture technique for the lower lid epiblepharon correction.
Results A total of 943 lower lid epiblepharon patient (403 male, 540 female) records were included in the analysies. The mean patient age was 6.7 ± 2.4 years, and the mean postoperative follow-up was 12.9 ± 7.2 months. Eyelid shape and function were well maintained in 904 patients (95.9%), with no recurrence during the follow-up. Among the recurrent cases (39 patients [4.1%]), 19 patients (2%) underwent a second correction surgery.
Conclusions The minimal skin & orbicularis oculi muscle resection with full thickness rotating suture technique for lower lid epiblepharon showed good surgical outcome with few complications and high success rate.

• S011

Nasolacrimal duct reconstitution with radiofrequency: case report

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Purpose To describe a minimal invasive technique for nasolacrimal duct reconstitution with radiofrequency in a case of lacrimal flow restriction.
Methods Case report of a 23 years-old female, with previous history of tearing, swelling, redness and pain over the innermost aspect of the lower eyelid of her right eye (RE). The symptoms started four years ago and sometimes relapses and discharge. The patient denies any other comorbilities, systemic or local complaints or any medication. External examination RE: Milder test +++, BUT inferior to 3". LE: Milder test +, BUT inferior to 3". Both eyes present inferior punctate keratopathy. It was diagnosed low nasolacrimal obstruction in RE, confirmed with dacriocistography. Treatment option was nasolacrimal duct reconstitution with radiofrequency under sedation and local anesthesia.
Results The patient was followed for at least one year. She was evaluated for the presence of secretion, epiphora, reflux at compression of the lacrimal sac, placement of silicone tube and Milder test. At postoperative visits, the patient presented positive irrigation with clearance of lacrimal duct.
Conclusions Reconstitution with radio frequency seems to be a solution to be considered. The presented technique was effective in the treatment of nasolacrimal duct obstruction with a good safety profile, being less invasive when compared with the classic DCR. Prospective, comparative, multicentric studies and larger follow up are still needed.

• S012

The digital slide scanner applied to the ocular anatomopathology

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Purpose The photographed histological slides give a fixed picture of the histopathologic lesion. The slide cannot be generally photographed in its entirety, several contiguous photographs are often necessary to reconstitute the image, all the more in the strong magnification. The digitalization of slides allows the user to move virtually and to change amplification on the entire slide.
Methods The digitalization is made by a scanner and the software reproduces the features of a microscope such as the movements in the horizontal plan and the various magnification. To better understand, we can make a parallelism with the applications often used in the common life. Google map © makes the mapping of the zone of interest ; and Google Earth © allows the user to evolve virtually inside this map.
Results The collaboration between the departments of ophthalmology and anatomopathology of SAINT ETIENNE HOSPITAL allowed to create a digital database illustrating the ophthalmologic pathologies documented by the clinical photographs and the corresponding anatomopathology.
Conclusions The digital slide scanner performs in the time of telemedicine by offering the possibility to the pathologists and to the clinicians of the same medical facility or different facilities to share more easily. This equipment represents an innovative and didactic educational tool for the learning of the ocular anatomopathology. The problem of the storage of slides finds also an interesting issue there.

• S013

Measuring scleral thickness with optical coherence tomography in osteogenesis imperfecta: a case report

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Purpose The blue sclera appearance is a distinctive but non-specific clinical sign for osteogenesis imperfecta (OI), a connective tissue disorder caused by an abnormality of type I collagen. It is a challenging diagnosis because multiple bone fractures, occurring in early childhood, can be the only sign of the non-lethal forms of OI. In these situations, differential diagnosis with child abuse is a major concern for Pediatricians. Aim: to investigate the scleral optical coherence tomography (OCT) and thickness measurement as a diagnostic test for OI.
Methods The sclera of a 28-year-old man affected by a mild form of OI and presenting a blue scleral hue was examined with the sclera mode coupled with the enhanced depth imaging of the spectral domain OCT equipped with the anterior segment module device (SD-ASOCT) (Heidelberg Engineering GmbH, Heidelberg, Germany). The scleral thickness was measured at a distance of 2000µm from the scleral spur in eight meridians. Three measurements in each meridians were averaged and the mean and the standard deviation of the eight meridians were calculated. The examination of an age matched healthy volunteer served as a control.
Results The mean scleral thickness of the OI patient was lower than that of the healthy patient, 277µm±43µm versus 470µm±50µm. The superotemporal meridian was the thinnest in both patients.
Conclusions These findings are consistent with the pathologic features previously described. The blue color results from the visualization of the underlying choroid through the translucent and thinner sclera. The in vivo scleral thickness measurement is a rapid and non-invasive diagnostic tool that may be useful for challenging cases, especially in children with multiple fractures.

• S014

Comparison of the retinal measurements of standard and neurological SD-OCT applications in MS patients

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Purpose In multiple sclerosis (MS), spectral domain optical coherence tomography (SD-OCT) provides a tool to evaluate structural retinal changes related to MS. Recently, an application dedicated to visualize and quantify changes in MS and other neurodegenerative diseases became commercially available. Unlike the standard SD-OCT, it is not yet widespread in eye clinics in Finland. Therefore, aim of the present study was determine if correlation exists in the retinal measurements between this and standard SD-OCT application, using scan pattern presets feasible in monitoring of MS.
Methods Seven patients (mean age 48.2±12.8 years) with previously diagnosed MS were examined in both eyes with Spectralis SD-OCT (Heidelberg, Germany) in Kuopio University Hospital, Finland. Retinal nerve fibre layer (RNFL) thickness scans around the peripapillary retina (PPR) were performed with the Nsite Analytics and the standard glaucoma application (Heidelberg). Volumes of the retina and its layers in the 9 macular sectors, as defined by the Early Treatment Diabetic Retinopathy Study (ETDRS), were measured by Heyex Viewing Module software with automated retinal layer segmentation (Heidelberg).
Results Correlations between the measurements of the Nsite Analytics and the standard application were strong ($r>0.9$; $p<0.01$) in PPR RNFL thickness and in total macular retinal volume. In part, correlations of retinal layer volumes were weaker. Both applications interpreted the degree of PPR RNFL atrophy in a comparable manner ($\kappa>0.7$; $p<0.01$), except the temporal superior sector.
Conclusions As an accessible alternative, the standard SD-OCT can be used for measuring retinal changes in MS patients. However, an application actually designed for neurological diseases provides tools to visualize these changes and to evaluate the degree of the thickening of PPR RNFL above normal limits.

• S015

Fate of donor sclera used to lengthen extraocular muscle in a rabbit model of strabismus surgery

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Purpose To evaluate the fate of donor sclera used to elongate the superior rectus muscle in rabbit eyes. Donor sclera is sometimes used to further weaken an extraocular muscle in patients that have had previous strabismus surgery. The fate of the donor sclera is, at present, unknown and a question posed by many patients.
Methods The superior rectus (SR) muscle was elongated with a 5 mm piece of donor sclera and examined at 1, 2, 4, 12 and 16 weeks postoperatively in a total of 20 rabbits. The SR muscles along with the attachment to the eye were collected, immediately frozen and later serially sectioned and processed for H&E and immunohistology. Multiple antibodies were used to detect the donor and bulbar sclera, as well as activation and proliferation of muscle progenitor cells on the serial sections.
Results The donor sclera was easily identified in the collected specimens until 4 weeks postoperatively. At 12 weeks, only smaller rests of donor sclera were present. Nuclei and muscle progenitor cells were not detected in the donor sclera. At 16 weeks postoperatively, the donor sclera could no longer be identified and the SR insertion on to the bulb was found approximately 5 mm posteriorly from its normal insertion site. Staining for NCAM, myogenin, MyoD and KI-67 were present in the repairing area in all specimens collected at the 1-12 weeks but practically absent from the specimens collected at 16 weeks.
Conclusions Muscle progenitor cells did not invade the donor sclera and the donor sclera was gradually reabsorbed and no longer present after 16 weeks after surgery, in this rabbit model of strabismus surgery. The method was effective for achievement of a new, more posterior insertion site of the SR.

• S016

A new method of exophthalmometry

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Purpose Hertel's exophthalmometer measures the position of the eyeball in relation to the lateral orbital rims and does not provide representative results in patients with orbital asymmetry. The purpose of our study was to develop an easy-to-use, accurate and reliable method of exophthalmometry in patients with orbital asymmetry and compare its potential with Hertel's exophthalmometer.
Methods We performed the retrospective study of computerized axial tomography scans and ambulatory medical records of 30 patients: 7 patients with intact lateral orbital wall (group 1), 23 patients with its fracture (group 2). The scans were evaluated with RadiAnt DICOM Viewer software. With tools of the software we drew a straight line through the apices of styloid processeses of temporal bone. This line served as a reference line for all further measurements. On the image, where the cornea of the first eyeball was the most prominent, we constructed a perpendicular to the most prominent point of the cornea. In the same way, the distance from the most prominent point of cornea to the reference line was measured for the second eye. The difference between the lengths of two perpendiculars corresponded to the difference of protrusion between two eyes. The data of our method of computer exophthalmometry were compared with the results obtained with Hertel's exophthalmometer specified in the ambulatory medical records.
Results In patients of group 1 differences of protrusion between two eyes measured with two methods were similar. In contrary to the Hertel's exophthalmometer, the computer exophthalmometry showed reliable results in patients of group 2.
Conclusions The developed method of computered exophthalmometry is easy-to-use and allows getting accurate and reliable data even in patients with different abnormalities of orbital area, in contrary to the Hertel's exophthalmometer.

• S017

Thickness of chorioretinal complex in the fovea in teenagers with myopia

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Purpose To study the features of chorioretinal complex in teenagers with myopia of different degree this work was done.
Methods Measurement of choroidal layer thickness in the fovea was performed in 27 patients aged 14-16 y.o. (7 with mild degree of myopia, 10 with medial and 10 with high degree) .Visual acuity with correction was (0,8±0,2), refraction (-1 - 7,0) dptr (average (-3,6 ± 0,45) dptr). All patients underwent General ophthalmic observation; the thickness of the choroidal layer was measured by OCT (SPECTRALIS Tracing Laser Tomography, Heidelberg Engineering) according to standard protocols in the fovea in both directions of scan. The value of chorioretinal complex in the fovea was measured from the vertical Hyper-reflective layer of pigment epithelium to the border connections of the choroidal and sclera tissues.
Results Data analysis showed significantly greater thickness (198 ± 15,9) μm of chorioretinal complex in fovea in children with mild myopia, than in medial cases (164±17,0) μm, p=0,02 and myopia of high degree (139 ± 17,0) μm, p=0,001. It is known that in healthy patients choroidal thickness is 270-350 μm, i.e. in adolescents with myopia choroidal thickness is significantly thinner. We have not found significant differences of choroidal thickness in patients in the fovea when measured in the horizontal and vertical directions of scan (paired t-test, p =0,2).
Conclusions It is established that the thickness of chorioretinal complex in the fovea in adolescents with myopia is significantly thinner compared to healthy. 2. The thickness of chorioretinal complex in the fovea in adolescents with mild myopia significantly thicker than in teenagers with myopia of medial and high degree (p=0, 02, p=0,001, respectively).

• S018

An investigation of the correlation between functional and structural changes in tilted and non-tilted high myopic eyes

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Purpose Tilted optic disc, a common finding in high myopic eyes, may affect visual field. Since the retinal defects often precede the visual field defects so evaluation of retinal layers thicknesses provide detailed information about the retina that may help us in earlier detection of pathologic changes in high myopic eyes. The aim of current study is the investigation of the correlation between functional and structural changes in tilted and non-tilted high myopic eyes.
Methods Fifty eight high myopic individuals were underwent detailed ophthalmic examination and divided into two groups according to the presence of the tilted optic disc. Correlation between visual field and retinal layers thicknesses in 20 patients (mean age of 28.95±7.22 years) with tilted optic disc were compared with 38 patients (mean age of 27.87±6.08 years) without tilted disc using 30-2 SITA standard program with Humphrey Field Analyzer – HFA II-*i* and optical coherence tomography, respectively. Correlation of functional and structural findings was evaluated in 10 central degrees in four matched quadrants.
Results Although there was a relative correlation between structural and functional tests in all quadrants but the most significant correlation was related to the nasal threshold sensitivity and temporal total average thickness in tilted group. (r=-0.55) The results showed that with decreasing the visual field sensitivity, the ganglion cell layer thickness decreased but retinal nerve fibres layer thickness increased in some quadrants.
Conclusions The results showed relative correlation between structural and functional tests but the structural findings presented the defects earlier than functional findings. Therefore, the structural investigation in tilted myopic eyes suspected to visual field defect is recommended.

• S019

Reflectometric analysis of normal and ex-premature foveal microstructure in SD-OCT images - a comparison to image analysis using directional OCT and manual segmentation

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Purpose To determine the topography of different foveal layers from reflectometric profiles of conventional OCT images of the fovea and to compare the results to those obtained by directional OCT and manual segmentation.
Methods Eyes from normal individuals and young adults with a history of prematurity were imaged with an SD-OCT system. Ex-premature cases were grouped to represent different stages of abnormal maturation. Horizontal B-scans through the foveal center (FC) with a distinct light reflex were selected for profile analysis perpendicular to the flattened retinal pigment epithelial layer at regular intervals from the nasal and temporal points of maximum foveal thickness. Distances between highly reflective peaks in the scans were measured and expressed as layer thicknesses at various positions from FC.
Results Several peaks of reflectivity representing different photoreceptor components could be identified and measured. In spite of the marked abnormality of retinal thickness and the combined thickness of the Henle fiber layer (HFL) and outer nuclear layer (ONL) at FC, the thickness of the outer and inner segment layers was within normal range both in center and periphery. A comparison to data obtained by an alternative method using directional OCT revealed that the reflectometric technique was better at characterizing photoreceptor outer segment changes, wheras directional OCT was superior in defining the photoreceptor cell body (ONL) and axon (HFL) layers
Conclusions Analysis of reflectometric profiles showed no difference in outer segment thickness between normal and and ex-premature cases with abnormal central fovea. The technique of OCT reflectometric profile analysis is preferable for characterizing photoreceptor outer segment changes whereas manual segmentation of tilted OCT images is better for defining the HFL and ONL as separate layers.

• S020

Comparative analysis of the morphometric parameters of the macular area of the retina in patients with refractive, axial, mixed and combined tipes of myopia

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Purpose Comparing the parameters of the macular area in patients with refractive, axial, mixed and combined myopia.
Methods 63 patients (121 eyes) with myopia (-3,20±2,8 D) (20,46±12,13 y.o.) were identified in the groups: refractive (RM) - 28 eyes, combined (CM) - 11 eyes, axial (AM) - 65 eyes and mixed myopia (MM) - 17 eyes. Patients hold: visometry, kerathometry, refraktometry, ultrasonic echobiometry, OCT of the retina and the anterior chamber angle (ACA).
Results In patients with MM (242,0± 12,4 μm) macular thickness (MT) was less than in RM group (249,2±9,4 μm). In AM group the fovea thickness (FT) was (184,44±20,28 μm) higher (p<0,01) than in the RM (169,64±20,64 μm) MM (168,05±19,74 μm) and CM (172,30±15,2 μm) droups. Fovea volume (FV) was less (p<0,01) in the MM group than in patients with AM (6,90±0,34 mm^3), RM (7,01±0,26 mm^3) and CM (6,91±0,24 mm^3).
Conclusions 1. Patients with MM had a tendency to decrease MT at 2.5% in comparing to CM and AM and significant reduction at 2,9% compared to the RM (p <0,05), as well reduction of FV at 10% (p<0,01) comparing to AM, RM and CM. MM showed the correlation FV with the axial length (AL) (r=-0,54, p<0.026) and refraction (r=0,54, p<0.024). MM had correlation between corneal thikness and FT (r=0,58, p<0.014).
2. AM had minimal FT thikner at 11% and FT in the area of 0.6 mm at 8% comparing to the RM (p<0,01), MM (p <0,01) and CM (p<0,05 and p <0.01).
3. RM had tendency of influence of the anterior segment parameters on the macula area - a negative correlation of the width of the ACA (r=-0,27, p<0.16) and the intraocular pressure (r=-0,48, p<0.009) with TF and positive correlation corneal`s curvature with MT (r=0,34, p=0.07) and FV (r=0,35; p=0.06).

• S021

Manufacturing of an ocular prosthesis based on the 3D printed anophthalmic socket

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Purpose In anophthalmos, the ideal ocular prosthesis restores the facial appearance and eye motility, and is comfortable to wear. This can best be achieved with a bespoke prosthesis. The initial step usually involves injection of dental impression material to obtain a mould of the anophthalmic socket. However, the socket impression method distorts the soft tissues, so that additional alterations to the prosthesis are required via the trial and error method. Developing an impression-free method of the anophthalmic socket.
Methods A cone-beam CT of the anophthalmic orbit is taken, and with computer-aided design and computer-aided manufacturing (CAD/CAM) the anophthalmic socket is printed three dimensionally (3D). The 3D-printed socket is subsequently used as a trial working prosthesis in the conventional way.
Results With this novel technique, a prosthesis was successfully fitted in a 68-year-old male who had undergone a recent evisceration.
Conclusions Computer-aided design and 3D printing can accurately outline the anophthalmic cavity. Validating the impression-free moulding technique is subjected to further studies.

• S022

Surface chemistry of the interactions of cationic nanoemulsions with human meibum films

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Purpose Ikervis® (IKV) cationic nanoemulsions (CNE) were demonstrated to enhance tear film stability in vivo possibly via effect on tear film lipid layer (TFLL). Therefore the interactions of IKV and of binary and ternary mixtures of its constituents were studied with human meibum (MGS) films. The binary mixtures consisted of 2% mid chain triglycerides (MCT) blended with 0.005% cetalkonium chloride (CKC) and 0.3% Tyloxapol (e.g. MCT/CKC and MCT/Tylo respectively). The ternary mixture contained MCT/CKC/Tylo (2%/0.005%/0.3%). The impact of 0.1µM bovine submaxillary mucin (BSM) on CNE/MGS interactions was also evaluated.
Methods MGS and CNE oils were spread at the air/water interface of a Langmuir surface balance in range of 2D ratios (20/1, 10/1, 5/1, 3/1, 2/1 and 1/1) at two measurement regimes: with (i) MGS or (ii) total lipid amount kept constant. The films capability to reorganize during dynamic area cycling was evaluated. The layers dilatational rheology was probed via the step/relaxation method. Films structure was monitored with Brewster Angle microscopy.
Results The binary mixtures showed limited spreading and miscibility with MGS resulting in poor mechanical properties. The ternary mixture and IKV spread and mixed well with MGS. At fixed MGS amount, the inclusion of CNEs enhanced the structure, properties and elasticity of the layers. At fixed total lipid, the films remained primarily elastic, but at high (≤3/1) CNE content the elasticity slightly decreased and heterogeneities in layers structure were observed. BSM enhanced the ternary mixture (IKV)/ MGS interactions.
Conclusions At physiologically relevant MGS/CNE ratios MCT/CKC/Tylo and IKV interact favorably with MGS films. The positive effect of BSM suggests that polyanionic polysaccharides can enhance CNE/TFLL interactions in vivo.
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Conflict of interest
Any post or position you hold or held paid or unpaid?:
Santen SAS employee

• S023

Peter's anomaly in twins: a rare incidence with novel associations

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Purpose Peter's anomaly is a rare developmental malformation involving the anterior segment of the eye culminating in congenital blindness, with or without systemic associations. herein, we report an incidence of this anomaly in twins with novel associations.
Methods Chart review, clinical and radiological assessment.
Results The probands are 2 year old Saudi boys (twin I and twin II) born to consanguineous mates at 36 weeks following uneventful pregnancy. On examination: both twins were not blinking in response to light and were not able to fixate and follow a moving object with prominent horizontal nystagmus. Slit lamp examination demonstrated varying degrees of central leukoma (corneal opacity) associated with iridocorneal adhesion characteristic of type I peter anomaly in both twins. No catarctous changes were observed. A normal intraocular pressure with intact retinas were seen in both twins. Striking pupillary abnormalities include bilaterally underdeveloped pupil (twin I) and bilateral absence of the pupil (twin II). Ocular ultrasound: revealed bilateral vitreous hemorrhage mostly linked to deranged coagulation. Ocular MRI: showed bilateral microophtalmia and optic nerves hypoplasia with small optic chiasm in both twins. Systemic associations: both twins have coarse facial features and a thrombophilia state secondary to homozygous protein C deficiency; a rare thrombotic condition seen in 1\4000000 live birth. Twin II developed bilateral inguinal hernia and cryptorchidism
Conclusions The novel concordance of peter's anomaly in these twins is probably an emerging evidence supporting the genetic basis of this defect. Optic nerve and optic chiasm hypoplasia along with the severe protein C deficiency and bilateral absence of the pupil are all important associations which have never been reported previously with this anomaly.

• S024

Severe ocular manifestations of rosacea in adult

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Purpose Ocular rosacea in adult is a rare condition that may be responsible for palpebral, cunjonctival and corneal complications with severe visual functional prognosis in some cases. The purpose of this study is to determine the nature and prognosis of corneal complications in this disease through our study and literature review
Methods We report seven patients (14 eyes) with severe ocular rosacea requiring hospitalization
Results The mean age of our patients was 59.6 years. Six patients (85.6%) were female. Visual acuity was <1/10 in 10 eyes. The complications were keratitis in 7 eyes, corneal ulcerations in 5 eyes, corneal perforation in 5 eyes, and catarrhal infiltrates in 6 eyes. Limbal neovascularization was noted in 11 eyes. Only one patient has ocular-cutaneous form. All patients were treated with oral cycline, topical steroids in acute phase, artificial tears and eyelid hygiene. A bandage contact lens was applied to 4 eyes. Three eyes required penetrating keratoplasty. They were successfully treated with improvement of symptoms and cicatrisation of corneal lesions. One case of corneal graft failed secondary to infectious keratitis.
Conclusions The diagnosis of ocular rosacea is difficult because it often occurs without skin involvement. Ocular rosacea is the only complication of cutaneous rosacea. Diagnosis should be as early as possible because ocular complications are possible, with blinding potential. The best treatment is prevention with regular eyelid hygiene.

• S025

Pollen count compared with severity of symptoms and signs of dry eye disease in Norway

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Purpose To investigate whether pollen counts are associated with severity of symptoms and signs of dry eye disease (DED) in Oslo, Norway.
Methods The mean daily number of birch or grass pollen grains per cubic meter of air (pollen count) in Oslo from 2012 to 2015 between March and September were provided by The Norwegian University of Science and Technology and The Norwegian Asthma- and Allergy Association. Four hundred and twelve DED patients that were examined for the first time on the same day as pollen data were available were included. Symptoms of DED were measured by the Ocular Surface Disease Index (OSDI) self-report questionnaire and signs of DED included measurements of tear osmolarity, tear film break-up time, blink interval, ocular protection index, Schirmer I, staining, meibum expressibility and meibum quality from the right eye. Symptoms and signs, as well as the composite score for dry eye severity level (DESL), were compared with pollen count using Pearson's and Spearman's correlations, Chi square test and Mann-Whitney U-test.
Results Birch pollen was generally only detectable during April and May, whereas grass pollen was normally detectable during June. Neither birch (rs=-0.13; P=0.81) nor grass (rs=0.06; P=0.38) pollen were associated with symptoms of DED as measured by the OSDI. Except Schemer I test, which surprisingly was negatively related to grass pollen count (rs=-0.15; P=0.02), neither pollen types correlated with DESL or any signs of DED. Only 5.6% of the patients reported the use of systemic prescription drugs against allergy, thus the weak association between pollen counts and severity of DED appear not to have been confounded by concomitant use of anti-allergy medications.
Conclusions The severity of symptoms and signs of DED in Oslo, Norway does not seem to be strongly associated with either birch or grass pollen count.

• S026

Graft functionality after DSAEK surgeries in Denmark from 2006 to 2009

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Purpose To report graft functionality after the first DSAEK procedures performed in Denmark.
Methods All primary DSAEK operated eyes in Denmark between 2006 and 2009 were analysed. Patients from three different surgical centers were included, covering all centers performing DSAEK in Denmark during the study period. Events of graft rejection, graft failure and rejection-related graft failure were recorded, and Kaplan-Meyer survival curves were used to determine duration of event-free survival of the grafts.
Results Data collection is ongoing until august 2016
Conclusions -

• S027

Erroneus measurement of the intraocular pressure with the goldmann aplanation tonometry in fuchs endothelial corneal dystrophy

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Purpose Fuchs endothelial corneal dystrophy (FECD) is a bilateral, progressive, disease of the corneal endothelium. It's caused by an abnormal collagen deposition in Descemet membrane leading to progressive degeneration of endothelial cells. The loss of endothelial cells prevents the removal of water from the cornea, causing corneal edema. Later stages involve other layers corneal layers. It is most frequently a spontaneous disease although several autosomal dominant mutations have been reported.
It has been described that corneal thickness influences the corneal biomechanics properties, leading to an erroneous measurement of the intraocular pressure (IOP) with the Goldmannn aplanation tonometry
Methods We report a patient diagnosed with FECD and his IOP was measured with Goldamann applanation tonometry (GAT) and Ocular Response Analyser (ORA). As well as corneal hysteresis (CH), corneal resistance factor (CRF) were recorded with the ORA. We have followed this patient for several years we also carried out corneal topographic maps and spectral domain optical coherence tomography (SD-OCT) to complete the study.
Results The evolution of our patient showed a corneal edema related to an abnormal endothelium. We noticed that compensated IOP was significantly higher than GAT IOP and Goldmann IOP due to biomechanic changes secondary to corneal edema.
Conclusions IOP in patients with FECD and edema should be measured with ORA so compensated IOP is registered avoiding the underestimation of only GAT.

• S028

Peripheral refraction and retinal contour after FS-LASIK and orthokeratology

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Purpose A variety of factors that change the topography of the cornea may also induce changes in peripheral refraction. The paper is aimed at assessing the peripheral refraction and retinal contour of myopic eyes after FS-LASIK and orthokeratological (OK) correction.
Methods We examined 30 patients (60 eyes) including 12 patients (24 eyes) aged 28.86±2.83 years with myopia of -5.11±05 D on average, and axial length (AL)=25.04±0.33 mm before FS-LASIK and 1 month after it and 18 patients (36 eyes) with myopia of -5.4±0,24 D on average, AL=25.78±0.2 mm who wore ESA-DL OK-lenses. All patients were tested for peripheral refraction on Grand Seiko Open-field binocular autoref/keratometer and had their peripheral eye length measured on IOL Master 500 (Carl Zeiss) at 15° and 30° nasally (N) and temporally (T) from the center of fovea.
Results The peripheral eye length measured before and after FS-LASIK as well as after OK-correction was less in all peripheral zones than the central length, which corresponds to hyperopic peripheral defocus. Refraction measured after FS-LASIK showed the formation of myopic defocus with a maximum at 30°: T15° -2.49 D, N15° -2.5 D, T30° -6.73 D and N30° -7.8 D. The maximal myopic defocus after OK-correction is detected in the middle periphery: -4.89 D at T15°, -5.51 D at N15°, -2.92 D at T30° and 2.4 D at N30°.
Conclusions Both procedures induce a significant peripheral myopic defocus. In the first case, the maximum values of defocus is detected in the peripheral zone (at 30° from the center of the fovea), in the second case it affects the middle periphery (15° from the center) most of all. Such patterns of peripheral refraction fully coincide with the specific changes in corneal topography after the two procedures. The retinal contour within 30° from the center retains the relative hyperopic defocus characteristic of intact myopic eyes

• S029

A new approach of presbyopia over a myopic population : PresbyLASIK using the myopic SUPRACOR Algorithm (preliminary results about 12 eyes)

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Purpose The aim of our study was to analyze refractive outcomes and satisfaction after myopic presbyLASIK with induced micro-monovision (-0,50D), a new approach of correcting presbyopia among myopic patients.
Methods This retrospective consecutive cases study included 12 eyes of 9 patients treated for myopia and presbyopia with central presbyLASIK with micro-monovision using the Technolas 217P excimer laser (Technolas Perfect Vision GmbH, Munich, Germany) between december 2014 and May 2016. Study parameters included uncorrected distance visual acuity (UDVA) and uncorrected near visual acuity (UNVA), iniitial and final sphere and cylinder, abberrometry, central steep zone, and patient satisfaction.
Results Patients median age was 50.7 ± 4 years (range: 46 to 54 years).,predominantly females at 78%, with a mean preoperative spherical equivalent of -3.38 [-1.25; -5.25[. Mean postoperative spherical equivalent refraction was 0.18 ± 0.47 diopters (D) for dominant eyes and -0.45 ± 0.46 D for dominated eyes. Mean monocular UDVA was 0.09 ± 0.10 logMAR (Snellen 20/24) at 1 month postoperatively. Mean binocular UDVA was -0.06 ± 0.07 logMAR (Snellen 20/18) at last follow-up visit. Mean binocular UNVA was 0.18 ± 0.14 logMAR (Parinaud 2). At 1 months, 83,3% of patients achieved 20/20 or better and could read Parinaud 2 binocularly, and 91,6% of patients achieved 20/20 and could read Parinaud 3 binocularly. The mean central steep zone was 1.95 ± 1.00 D. There was no need for retreatment (under/over-correction) but one eye underwent interface washing with corticoids. Patients were satisfied in 92 % and 80% were independent of spectacles at all distances.
Conclusions Myopic PresbyLASIK is safe and efficacious with postoperative improvement in binocular vision at far, intermediate, and near distances vision, being an attractive alternative to monovision.

• S030

Clinical evaluation of oculus keratograph corneal topographer in normal population

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Purpose Corneal topography is a non-invasive medical imaging technique for mapping the surface of the cornea. Since cornea is normally responsible for more than 70% of eye refractive power, its topography is of great importance in determining the quality of vision and corneal health. It seems important to have detailed information of corneal topography in order to understand contribution the cornea makes to vision.
Methods 500 eyes of 500 normal subjects were investigated using the Oculus Corneal Topographer. Slit lap biomicroscopy was utilized in conjunction with standard descriptions of changes to assess pathologies of anterior segment. Anterior surface of the cornea and lid angle were evaluated using Oculus Corneal topographer.
Results The average corneal power in steepest and flattest meridian were 44.28±1.51 and 43.44±1.47, respectively. The mean of corneal astigmatism was -0.90± 0.55 diopters. The average value of corneal parameters were as follow: Eccentricity 0.52±0.11, Index of Surface Variation 18.73±5.36, Index of Vertical Asymmetry 0.12±0.05, Keratoconus Index 1.01±0.02, Central Keratoconus Index 1.01±0.01, Index of Height Asymmetry 6.21±4.21 and Index of Height Decentration 0.01±0.00. The mean of pupil diameter was 3.43±0.72. Corneal asphericity was estimated in three diameters of 5, 6 and 7 millimeter and the average values were -0.21±0.11, -0.24±0.10 and -0.27±0.11, respectively. The mean value of lid angle was reported as 12.29±3.77 degrees.
Conclusions This study have provided detailed and applicable description of computerized corneal topography parameters in a normal population which is useful in diagnosis and management of anterior segment disorders, such as keratoconus and corneal ectatic, preoperative assessments of refractive surgery procedures and contact lenses prescription.

• S031

The prospects of using the radiation for the assessment of corneal and scleral hydration

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Purpose An adequate water balance (hydration extent) is one of the basic factors of normal eye function, including its external shells – the cornea and the sclera. THz systems creating images in reflected beams are likely to become ideal instruments of noninvasive testing of corneal and scleral hydration degree as THz radiation is highly sensitive to water content. The paper aims at studying the transmittance and reflectance spectra of the cornea and the sclera of rabbit and human eyes, as well as those of the whole rabbit eye, in the frequency range of 0.13-0.32 THz.
Methods The experiments were carried out on 3 corneas and 3 rabbit scleras, 2 whole rabbit eyes, and 3 human healthy adult scleras using a specially developed THz system based on reliable and easy-to-use continuous wave sources: a backward-wave oscillator and an avalanche transit-time diode.
Results The transmittance spectra of the cornea and the sclera and the dependence of the reflection coefficient of these tissues in THz range on water percentage content were determined. Comparison of the rabbit cornea hydrated from 73.2% to 76.3% concentration by mass demonstrated an approximately linear relationship between THz reflectivity and water concentration. The decrease of free water concentration by 1% leads to a drop of the reflectance coefficient by 13%. The parameters studied displayed noticeable differences between the sclera and the cornea of rabbits and between rabbit sclera and human sclera.
Conclusions Preliminary results demonstrate that the proposed technique, based on continuous THz radiation, may be used to create a device for noninvasive testing of corneal and scleral hydration, which has good potential of wide-scale practical application.
The work was supported by the Russian Foundation of Basic Research (grant No.15-29-03843)

• S032

Comparison of MyoRing implantation with corneal collagen cross-linking in different combination for keratoconus treatment

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Purpose to compare outcomes of intrastromal ring (MyoRing, DIOPTEX GmBH, Linz, Austria) implantation with corneal collagen cross-linking in different combinations for progressive keratoconus (KC).
Methods The MyoRing implantation with simultaneous CXL was performed in 15 patients (16 eyes)—1 group, MyoRing implantation followed by CXL was performed in 19 patients (23 eyes)-2d group. At 26 patients (32 eyes) -3d group CXL was performed 6-24 months prior to MyoRing implantation. The mean follow-up was 12 months.
Results In the first group the UCVA improved from 0,08±0,05 to 0,35±0,24. SE decreased from -7,86±4,52 D to-0,25±2,82D. The mean K value reduced from 52,18±5,70 D to 44,29 D±5,77 D.(p<0,005.
In the second group the UDVA improved from 0,11±0,07 to 0,41±0,16. The mean K value decreased from 49,54±3,73 D to 40,27±4,41D. SE changed from -8,37±3,61 to 0,51 D±3,19. (p<0,005).
In the third group the UCVA improved from 0,10±0,05 to 0,40±0,25. SE decreased from -6,88±2,63 D to -0,79±2,29D. The mean K value reduced from 50,95±5,31 D to 43,92 D±6,63 D. (p<0,005)
Conclusions Visual and refractive outcomes didn't show significant difference in all groups. Refractive and keratometric stability was archived using three methods. The larger number of cases need to be examined to estimate long-standing results.

• S033

The evaluation of intrastromal MyoRing implantation with corneal collagen cross-linking in keratoconus treatment

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Purpose to evaluate functional results of MyoRing implantation with corneal collagen cross-linking for progressive keratoconus and to find differences in clinical outcomes between the group after Myoring implantation and the group after combined procedure.
Methods The corneal MyoRing implantation with corneal collagen cross-linking was performed in 71 eyes with progressive keratoconus of the II-III disease degree according to the Amsler classification. MyoRings were implanted using a Pocketmaker keratome. Saturation of the cornea was performed with 0.1% riboflavin within 10-15 minutes. UV irradiation was done after implantation of Myoring for 30 minutes. Mean thickness of the cornea at the thinnest point was 478 microns. The follow-up period was 24 months.
Results UCVA increased from 0,10 ± 0,06 to 0,39 ± 0,21, in the first day after surgery. Refractive power of the cornea decreased from 51,85 ±5,57 D to 44,55 ± 5,89 D. The spheroeqivalent(SE) preoperatively decreased from -7,79± 3,59 D to 0,14 ± 2,92 D. Dynamic observation after 24 months showed stabilization of clinical and functional results. UCVA was 0,50 ± 0,28, Keratometry – 45,53 ± 4,08D and SE was -1,80 ±2,98D.
Conclusions Combination of CXL and MyoRing implantation can be an effective approach for keratoconus treatment by providing visual rehabilitation. Intrastromal corneal MyoRing implantation with corneal collagen cross-linking allows correct not only the keratoconus followed ametropia but also to slow down the progression of the disease.

• S034

Assessment of postoperative corneal healing after epithelium-off cross-linking with a regenerating agent in progressive keratoconus patients

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Purpose To evaluate and compare data on corneal healing from randomised clinical trials (RCTs) in adult patients with progressive keratoconus undergoing epithelium-off corneal collagen cross-linking (epi-off CXL) and receiving a regenerating agent (RGTA).
Methods An individual study review and a meta-analysis were performed by searching RCTs assessing the effect of RGTA (Cacicol®) postoperatively used for keratoconus. We focused on the outcome related to corneal healing and epithelial defect size measured by slit lamp/ photography with fluorescein staining or optical coherence tomography. Other endpoints related to symptoms included ocular pain, burning, stinging, tearing, photophobia, conjunctival hyperaemia, and postooperative consumption of analgesics.
Results Three RCTs were identified for the meta-analysis including 118 patients (136 eyes) in total. The individual review showed faster reepithelialisation after instillations of RGTA compared to standard postoperative treatment (respectively, 83.3% ***vs*** 13.3% of patients healed at day 2 postoperatively, p<0.001), to artificial tears (61.1% ***vs*** 11.1% at day 3, p=0.002) and to hyaluronic acid (4.4±1.3 ***vs*** 6.1±2.3 days for complete healing, p=0.008). The meta-analysis showed that instantaneous chances of achieving complete healing over time were with RGTA twice as high as with control (Hazard ratio: 2.01; 95% confidence interval: [1.64; 2.47]; p<0.001). The overall safety profile of RGTA was found to be satisfactory.
Conclusions Instillation of RGTA facilitates corneal epithelial healing after epi-off CXL in patients with progressive keratoconus.

• S035

Tree years outcomes of small incision lenticule extraction: mild to moderate myopia vs. high myopia

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Purpose The purpose of this study was to compare the refractive outcomes of small incision lenticule extraction (SMILE) in high-myopic patients with those of mild- to moderate-myopic patients :3 years follow up
Methods This study included 212 eyes of 106 myopic patients treated with SMILE using a VisuMax 500-kHz femtosecond laser. Treated eyes were divided into two groups, according to the preoperative spherical equivalent (SE): mild to moderate myopia (A group, <-6.0 D) and high myopia (B group, ≥ - 6.0 D). Follow-up visits were at 6, 12, 24 and 36 months. The outcome measures included uncorrected distance visual acuity (UDVA), best-corrected distance visual acuity (BDVA), postoperative SE, efficacy index, safety index, and predictability.
Results Preoperative SE was -4.75 ± 0.62 D in the A group and -7.91 ± 0.94 D in the B group. No differences were observed between -0.17 ± 0.33 D in the A group and -0.22 ± 0.29 D in the B group 36 months postoperatively (p = 0.35). At 36 months postoperatively, 91.2 % and 82.5 % had an UDVA of 20/20 or better in the A and B groups, respectively. In the A group, 88.1 % and 97.9 % were within ± 0.5 D and ± 1.0 D, respectively, of the intended correction; in the B group, 86.0 % and 97.5 % were within ± 0.5 D and ± 1.0 D, respectively. The efficacy index was 1.04 ± 0.19 in the A group and 1.00 ± 0.17 in the B group. The safety index was 1.25 ± 0.14 for the A group and 1.23 ± 0.15 for the B group. The efficacy and safety index were not significantly different between the two groups 36 months postoperatively (p = 0.201 and p = 0.267, respectively).
Conclusions This long-term followed up study showed that SMILE is effective and safe for correcting high myopia, as well as mild to moderate myopia.

• S036

Electrospun polymer nanofibers as substrate/carrier for engineering of human corneal epithelium

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Purpose Electrospun polymer nanofibers present a structure similar to extracellular matrix (ECM) and support the surrounding cells. The type of polymer used, as well as the polymer blending-ratio, affects wettability. This in turn influences cell growth by altering the types of proteins adsorbed from the solution. Human corneal epithelial cells were grown on electrospun biodegradable and non-biodegradable polymer membranes to evaluate the membranes' potential within ocular surface tissue engineering
Methods The electrospun polymer membranes consisted of cellulose acetate, poly (lactic-co-glycolic acid) (PLGA), polycaprolactone (PCL), and blends of PCL and polyethylene glycol (PEG). Expression of ***CDH1*** (E-cadherin), ***ITGA6, ITGB4*** (Integrin α6β4) and ***MKI67*** (Ki67) genes were measured in all conditions after 14 days of culture using qRT-PCR.
Results Cells seeded on all types of membranes expressed ***MKI67***, which is associated with cell cycle activity and correlates with cell growth. ***MKI67*** expression was high in cells grown on 3:2 blends of PCL and PEG (2.88) and PCL (2.75). This amount was 1.75, 1.00 and 1.59 for cells grown on cellulose acetate, 1:1 blend of PCL and PEG and PLGA respectively. The amount of ***ITGA6, ITGB4*** expression was 1.72 in cells grown on PCL membranes, 1.10 for 3:2 blend of PCL and PEG, 1.05 for cellulose acetate, 1.53 for PLGA and 1.01 for 1:1 blend of PCL and PEG. Only cells grown on membranes containing blends of PCL: PEG showed ***CDH1*** expression, which is critical for cell-cell contact.
Conclusions All polymer membranes enabled cellular adhesion and proliferation. PCL:PEG and PCL membranes appear to promote the highest proliferative activity and strongest cell-membrane/cell-cell adhesion. Thus, these might be the most promising substrates for epithelial ocular surface tissue engineering.

• S037

Novel molecular design of culture substrates with amino acids

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Purpose Biocompatible and bioactive substrates are important in tissue engineering. The nature of these substrates can directly influence cellular response, ultimately affecting the rate and quality of new tissue formation. A novel atomic layer deposition/ molecular layer deposition (ALD/MLD) technique was used to build cell culture substrates to do a preliminary assessment of this techniques' potential within ocular surface tissue engineering.
Methods Organic-inorganic hybrid substrates were prepared with ALD/MLD, which enables deposition of single molecular layers of compounds in a very controlled manner. The substrates are based on amino acids, including lysine, arginine, glycine and aspartic acid, as organic building blocks and titanium as inorganic building blocks. Human corneal epithelial cells were cultured on the substrates for 7 days. The cells were then stained with Hoechst and imaged at 5x magnification with a fluorescence microscope. The number of cell nuclei per field of view was counted to compare cell density. In parallel, cells were also stained with trypan blue to assess the number of dead cells.
Results Confluent cultures were obtained on all substrates and most of the cells were alive. Substrates with glycine and titanium oxide yielded the highest cell density (1031 cells ± 65), whereas substrates with aspartic acid and titanium oxide (689 cells ± 48) gave rise to the least number of cells.
Conclusions Human corneal epithelial cells can be successfully grown on organic-inorganic hybrid substrates while retaining high viability. The novel ALD/MLD technique can be used to build biocompatible substrates using molecular design and further studies should be conducted to evaluate if this technique can be used to direct cell and tissue development.

• S038

DNA damage in human llmbal epithelial cells expanded ex vivo

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Purpose Limbal stem cell deficiency, secondary to insults and diseases, may be treated by transplantation of ex vivo engineered epithelial grafts. We here present preliminary data on levels of cellular DNA damage in grafts produced in two different types of culture medium.
Methods Cultures were initiated using corneo-limbal donor tissue after removal of the central area for transplant purposes. Explants (approx. 2x2 mm) were positioned epithelial side down on tissue culture treated polyester membranes and expanded for four weeks in complex medium or in medium with human serum. Cells were dissociated using Trypsin-EDTA (0.05%) for 30 min., the enzyme activity was further inhibited by medium and serum. The cell suspension was transferred to tubes on ice and processed using the Comet Assay. Duplicate samples from each culture were analyzed in each assay by visual scoring. Using a fluorescence microscope, 100 comets (50 from each gel) were classified into five categories, 0-4, representing increasing relative tail intensities. Summing the scores (0-4) of 100 comets therefore gives an overall score of between 0 and 400 arbitrary units.
Results Preliminary data show some levels of DNA damage in cells dissociated from the grafts regardless of the type of culture medium used. Anyway more experiments with other donors have to be done to have some conclusions.
Conclusions Recent studies have shown that medium with human serum equally support production of grafts containing differentiated as well as undifferentiated cells suitable for clinical transplantation. Preliminary data from our experiments indicate that levels of molecular damage to the DNA do not increase in cells cultured in human medium despite its lacks of complexity.

• S039

The effect of culture medium and carrier on explant culture of human limbal epithelium: a comparison of ultrastructure, keratin profile and gene expression

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Purpose To examine the effect of medium and substrate on morphology, on expression of selected keratins and on global gene expression in ex vivo engineered corneo-limbal grafts.
Methods Limbal biopsies retrieved from corneo-scleral rings of cadaveric donors were placed on human amniotic membranes or on plastic inserts and cultured for three weeks in parallel in either a complex medium (COM) or in medium containing human serum (HM) as single growth promoting supplement at 37°C and 5% CO2. Culture medium was changed every 2-3 days. Grafts were examined using light microscopy (LM) and transmission electron microscopy (TEM) and immunohistochemistry (IHC) (for 8 keratins), microarray and qRT-PCR were performed.
Results LM and TEM examination revealed similar multilayered stratified epithelium with cuboidal basal cells and flattened superficial cells with microplicae, attached to one another by desmosomes. In explants cultured on HAM, hemidesmosome-like junctions were observed between the expanded cells and the underlying HAM. Using IHC, expression of keratins was found to be similar in grafts engineered in the different conditions. We observed that cells cultured in the same medium (HS or COM) have more similarities in gene expression than cells cultured on same scaffold (PL or HAM).
Conclusions All explants have similar morphology and keratin expression.
The presence of hemidesmosome-like junctions between the expanded cells and underlying HAM on TEM may indicate better attachment of the expanded cells to the carrier surface as compared to the cells cultured on PL. Gene expression was more similar in cells cultured in the same medium (HS or COM) as compared to cells cultured on the same scaffold (PL or HAM), suggesting that choice of media is of greater significance for explant cell characteristics than choice of carrier.

• S040

The effect of silica nanoparticle exposure on cultured human keratocytes

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Purpose Silica nanoparticles (SiNPs) are closely related to our daily life including drug delivery, cosmetics and fine dust. However, the influence of SiNPs on human corneal keratocyte cells has not yet been widely studied. In this study, we investigated the effect of SiNPs on cultured human keratocytes.
Methods Human keratocytes were cultured in DMEM/F12(1:1) medium containing 10% FBS and Antibiotic-Antimycotic. SiNPs exposure was performed by adding 50nm, 100nm and 150nm of non-porous SiNPs into culture media with different concentrations (10, 20, 50, 100 microgram/ml) for 24 and 48 hours. Keratocytes viability was measured using CCK-8 reagent after 24 and 48 hour exposure of SiNPs. Release of Lactate Dehydrogenase (LDH) was measured by LDH cytotoxicity detection kit. The measurement of intracellular reactive oxygen species (ROS) generation was performed using Fluorometric Intracellular Ros Kit. Cellular autophagy activity (LC3B and Beclin 1) and mTOR pathway activation (p-mTOR and mTOR) were detected by Western Blot.
Results In human keratocytes, significant cellular cytotoxicity and membrane damage were not detected after exposure to three different sizes of SiNPs for 24h and 48h. Intracellular ROS generation was slightly increased at high concentration (100 microgram/ml) of three sizes of SiNPs. And Cellular autophagy was significantly activated in concentration-dependent manner after exposure to SiNPs for 24h with increase of western blot for LC3A/B. The upstream of autophagy signaling, the mTOR pathway, was slightly activated after exposure to three sizes of SiNPs.
Conclusions SiNPs (50, 100, 150nm) induced no significant cytotoxicity in cultured human keratocytes.

• S041

Development of novel electrospun scaffolds for corneal tissue engineering

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Purpose Blindness due to corneal disease or injury is one of the leading causes of blindness worldwide. Tissue engineering techniques are currently developed to create whole corneal replacement including corneal substitutes constructed from compressed collagen, electrospun fibres and decellularized corneal extracellular matrix (ECM). Here we combine these methods to develop electrospun scaffolds with different fibre alignments while incorporating ECM into the scaffolds to enhance the cell's environment and maintain the native cell phenotype.
Methods Porcine corneas were dissected, decellularized and milled to a fine powder. Gelatin or Polycaprolactone (PCL) were dissolved with or without ECM and electrospun in different alignments. Scaffolds were characterized by infrared spectroscopy (FTIR), water contact angle, fibre diameter, light absorbance and transparency. Human stromal cells were cultured for seven days and then analysed for survival, morphology and biochemical markers through immunohistochemistry and PCR.
Results New peaks corresponding to polypeptide bonds were observed in FTIR scans from PCL/ECM when compared to PCL along with a decrease in the water contact angle. No change was observed with the incorporation of ECM to gelatin fibers. Aligned fibre scaffolds from all samples absorbed less light and were more translucent. Random fibres resulted in a greater distortion of test images while PCL and PCL/ECM random samples were completely opaque. No change in survival was observed but fibre orientation and ECM did affect the cell morphology while orientation affected ALDH3a1 expression.
Conclusions Incorporating corneal ECM into aligned electrospun fibres mimics the cornea's native structure and environment while helping to maintain the keratocyte morphology and protein markers.

• S042

Ex-vivo porcine corneal storage using an innovative bioreactor

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Purpose There is no animal model of medium-term corneal storage. Unlike humans, animal corneas rapidly and dramatically swell and lose their transparency, suggesting that the passive eye banking technique is not adapted. Moreover, immersion in standard organ culture (stdOC) medium is not fully adapted for epithelial maintenance. Aim: To reproduce physiological parameters to improve storage of animal corneas.
Methods We designed a bioreactor (BR) that reproduces the intraocular pressure in the endothelial chamber while allowing renewing of the medium. We mimic blinking in the epithelial chamber, with an air-lifting system. Forty-one porcine corneas were stored either in the BR with 20mmHg in the endothelial chamber, or in stdOC vials at 31°C for 7 days. Endothelial viability, endothelial cell density (ECD) were assessed after labeling with Hoechst-Ethidium-Calcein. Transparency was assessed with a custom-made device and thickness by OCT. Limbus and central epithelial integrity was assessed using immunostaining of stem cells and differentiation markers.
Results In stdOC, corneas were edematous (2878±623µm), had reduced endothelial viability (44±16%), and lost most of the epithelial layers. In the BR, they were thinner (1274±154µm), had better endothelial viability (94±3%) and their epithelium was multilayered and mature. The epithelial stem cells seemed preserved.
Conclusions The porcine version of BR mimics physiological conditions and improves corneal storage. It could be a new model of eye banking and a powerful experimental platform to study corneal physiopathology.

• S043

OCT spectralis for terrien marginal degeneration diagnosis

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Purpose Terrien marginal degeneration is a rare idiopathic form of corneal degeneration that affects peripheral cornea, it occurs at any age and 75% of patients are males. This condition is most commonly bilateral and asymmetric.
Patients are often asymptomatic but they may also complain of irritation of the eye and progressive loss of visual acuity due to oblique astigmatism. Rarely the disease may lead to corneal perforation but may also occur spontaneously or secondary to trauma.
The most important corneal modifications in Terrien marginal degeneration, frequently located superonasaly, are observed in the stroma showing yellow – white opacities composed of lipids with associated vascularization.
Spectral Domain OCT because of its capacities to describe corneal anatomy might be useful in the diagnosis of the Terrien marginal degeneration.
Methods We present a case of a 75 year old male who was examined and followed during several months in the department of ophthalmology, Lozano Blesa University Clinic Hospital, Zaragoza, Spain, with slit lamp, corneal topographic maps and spectral domain- OCT.
Results SD-OCT confirmed the peripheral corneal thinning seen with corneal topographic map and slit lamp. It showed intact epithelial and endothelial layers surrounding the stromal cavity formation, and a perforation of the endothelium underneath this cavity.
Conclusions We point out the utility of spectral domain optical coherence tomography in the diagnosis and follow-up of cavity formation in the peripheral cornea in Terrien marginal degeneration.

• S044

AS-OCT utility for corneal lacerations in pediatric patients

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Purpose The purpose is to evaluate the utility of optical coherence tomography anterior segment (AS- OCT) through different clinical cases of corneal lacerations. OCT technology will help us to determine the corneal anatomy after trauma and deciding the therapeutic approach, in addition to guiding the prognosis, and evaluating response to treatment.
Methods We examined the corneal trauma patients with the AS-OCT performing exploration on the initial visit after trauma, which serves as a reference, and repeated again with the established treatment.
Results The AS-OCT provides us a more detailed diagnosis than one realized directly with the slit lamp, especially in pediatric patients, and helps us to determine more accurately the depth and location of the trauma diagnosis, possible presence of foreign bodies and to evaluate the response to treatment.
Conclusions The AS-OCT is a useful tool for an accurate diagnosis, especially in pediatric patients, in anterior segment ocular trauma and the evaluation of therapeutic response in these cases.

• S045

Terrien marginal degeneration presenting with corneal perforation

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Purpose Terrien marginal degeneration is a slow-progressing, bilateral but asymmetric degeneration of the peripheral cornea. The spontaneous corneal perforation is rare. To report a imminent corneal perforation as a presenting sign Terrien marginal degeneration, treated with amniotic membrane implant.
Methods A 70-year-old man presented with complaints of pain, redness,and decreased visión in the left eye (LE). Examination revealed peripheral corneal thinning 360º with superficial vascularization and secondary lipid keratopathy. There was an area of more thinning at the 5 o´clok position. His best-corrected visual acuities (BCVAs) were 90º-4 +4: 0.8 on the RE and 80º-3,75 +4: 0.6 on the LE. Corneal topography with Orbscan of the LE revealed high oblique astigmatism with Sim K values of 48.75D at 140° and 43.25D at 50°. AS-OCT showed corneal thinning and cavity formation with intact epithelial layer and affected endothelium in the thinned área.
Results Due to the imminet corneal perforation was selected to make an amniotic membrane implant. Several circular layers of amniotic membrane rolled up on themselves and placed in the thinned área, fixing them with nylon 10-0 suturing it to perilesional healthy cornea. The post-operative AS- OCT reveals good adhesion of the amniotic membrane and corneal thickness recovery.
Conclusions Terrien marginal degeneration is an unusual cause for a spontaneous corneal perforation. Patients with this disorder should be warned about this possibility. Surgery (lamellar graft, amniotic membrabe implant) can preserve corneal integrity and is indicated when conventional options fail to maintain vision or if perforation is imminent.

• S046

Possible misdiagnosis of patients with ocular trauma in a Danish emergency room without ophthalmic assistance. A retrospective cohort study of 1824 patients

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Purpose To examine weather patients with an eye injury coming to a Danish emergency room without assistance from an ophthalmic specialist were admitted correctly to an ophthalmic specialist or ophthalmic ward.
Methods All files containing The International Classification of Diseases 10 DS05 (injury of eye and orbit) and DT15 (foreign body on external eye) was found in the Patient Administrative System (FPAS, County of Funen, Denmark) of Svendborg Hospital, Denmark during a 5-year period (11.01.07-10.31.12). A total of 1824 patients were registered. From these files patients with a history of (1) trauma against the eye region and/or objective signs of eye trauma or (2) history of hammering against metal or stone were reviewed.
Results Twenty-four patients were included. Eighteen patients had obvious signs of severe eye injury with one or more of the following signs: Decreased visual acuity (n=14); irregular pupil (n=4); no pupillary reflex (n=4); hyphaema (n=3); open injury visual to the naked eye (n=2); subconjunctival haemorrhage (n=2). All eighteen patients were immediately transferred to an ophthalmological ward (n=15) or private ophthalmic specialist (n=3). Six patients had a history of hammering against stone or metal, but had no signs of severe ocular injury. Later on, one of these patients contacted an ophthalmic specialist because of continued eye symptoms. An orbital CT-scan was performed, but no intraocular foreign body was found. The other five patients responded by filling out a questionnaire remarking not to have had any ocular symptoms following the trauma.
Conclusions During a 5-year period there was no severe misdiagnosis of patients with ocular trauma in a Danish emergency room without assistance from an ophthalmic specialist.

• S047

Corneal perforation during laser assisted blepharoplasty

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Purpose Blepharoplasty is one of the most commonly performed oculoplastic prodecures. Laser-assisted blepharoplasty has been performed for several years with some advantages but also it has many complications. We describe two cases of corneal perforation developed during laser assisted blepharoplasty.
Methods Two patients were referred to our clinic for complaints about decreased visual acuity. They presented with decreased vision, pain and photophobia of their left eye after laser-assisted blepharoplasty. Both patients had a visual acuity of 20/400 in the affected eye and showed intraocular pressure as low as 5 mmHg. Slit-lamp examination revealed Seidel-positive corneal perforation surrounding corneal opacity with corneal folding. The anterior chamber was shallow with mild intraocular inflammation.Application of cyanoacrylate glue to the perforations was done and therapeutic lenses were replaced. Patients were treated with topical antibiotics and artificial tears four times a day.
Results One week after the injury, the IOP was elevated within normal range and intact epithelium without leaking was confirmed by slit-lamp examination. One month later, the visual acuity was regained and subepithelial and stromal corneal opacity was found without inflammation or leaking. And anterior segment optical coherence tomography revealed deep stromal corneal opacity.
Conclusions Corneal perforation during laser blepharoplasty seems probable with eyelid perforation by the laser beam. So during surgery, metal corneal protectors were placed, but corneal perforation could be developed because a Bell's phenomenon with elevation of the cornea superior to the corneal shields. Therefore, to prevent eyelid and corneal perforation, degree of laser power and exposure must be checked carefully.

• S048

Management of acute corneal hydrops in keratoconus with pre-Descemet's membrane sutures

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Purpose To report three cases of corneal hydrops in patients with keratoconus that were managed with pre-descemet's membrane (DM) sutures associated with intracameral air injection assisted with the ZEISS RESCAN 700 surgical microscope under general anesthesia to shorten the period of corneal edema, to achieve corneal stability and to reduce the duration of the use of carbonic anhydrase inhibitor.
Methods The first patient, a 27-year-old man affected by a Down's syndrome associated with a bilateral keratoconus presented with corneal hydrops in his right eye resulting from a central vertical tear in DM. Three horizontal pre-DM sutures were performed. The second patient, a 26-year-old man affected by a Down's syndrome associated with a bilateral keratoconus presented with corneal hydrops in his left eye resulting from a central horizontal tear in DM. Five vertical pre-DM sutures were achieved. The third patient, a 43-year-old woman with bilateral keratoconus presented with corneal hydrops in her left eye resulting from a central vertical tear in DM. Four horizontal pre-DM sutures were achieved.
Results One month after the pre-DM sutures, the edema resolved clinically and the pachymetry dramatically decreased on anterior segment OCT. The visual acuity of the Two first patients, while subjectively improved, were not measurable, the third patient visual acuity improved from counting fingers at 1 foot to 1,4logMAR at 20 foots from day one to month six.
Conclusions Intrastromal pre-DM sutures and intracameral air injection could promptly restore imperviousness of posterior stroma. This technique seems to be a useful procedure to shorten acute corneal hydrops. This impressive clinical response to stromal sutures led us to hypothesize that the pathogenesis of corneal hydrops may correspond to an acute "fracture" of the corneal stroma secondarily leading to DM tear.

• S049

Potential of High resolution Gabor-Domain optical coherence microscopy for early diagnosis of corneal disease

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Purpose We investigate the capability of a high volumetric-resolution imaging modality, Gabor-Domain Optical Coherence Microscopy (GD-OCM), to identify key features in the structural modification of the cornea in three frequent diseases.
Methods Host corneal buttons were excised during penetrating keratoplasty from patients with Fuchs' endothelial corneal dystrophy (FECD), type IIIA lattice corneal dystrophy (LCD) and keratoconus. We sutured them onto cadaver corneal rims to preserve their shape, mounted onto a corneal artificial chamber and pressurized under a pressure of 20 mmHg. We imaged them using GD-OCM in a non-contact mode, combining optical coherence tomography's high sectioning capability with confocal microscopy's high lateral resolution. The system achieved high-contrast imaging with a field of view of 1x1 mm2 and volumetric cellular resolution of 2 µm across a tissue up to 2 mm thick.
Results GD-OCM produced high resolution and high-contrast 3D images of the cornea's different layers. For FECD: the Descemet's membrane and stroma thickened and the density and size of keratocytes increased, along with associated guttae. Change in keratocytes seems to start in the posterior stroma in the early disease process and later heads toward the anterior stroma. For LCD: lattice linear deposits were identified in the anterior stroma, and for keratoconus, folds were identified in the posterior stroma, presumably Vogt's striae. For both, keratocytes and endothelial cells morphology was preserved.
Conclusions The GD-OCM revealed key pathologic features of several important corneal diseases and can be applied toward studying corneal diseases.

• S050

Corneal imaging and densitometry measurements to monitor fuchs progression and treatments outcomes

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Purpose Fuchs' dystrophy is a degenerative disease of the corneal endothelium leading to corneal edema and eventually to loss of vision. There are several treatment options including corneal transplantation, which can be full (Penetrating Keratoplasty) or partial (Descemet's stripping automated endothelial keratoplasty) thickness.Disease progression and treatment out comes are normally monitored by corneal thickness and visual acuity. In this study, we have used the new densitometry software for the Oculus Pentacam to compare the corneal clarity measurement between Penetrating Keratoplasty (PK) and Descemet's Stripping Endothelial Keratoplasty (DSAEK) in patients with Fuchs dystrophy
Methods A retrospective comparative study was carried out at Manchester Royal Eye Hospital. Data collection of one year after the corneal transplantation for 23 Fuchs dystrophy patients, including; best corrected visual acuity (BCVA), corneal densitometry, central corneal thickness(CCT) was analysed
Results Analysis of densitometry measurements found higher corneal densitometry after PK than DSAEK in the posterior layer between 2 and 6mm from the centre but it was not significant. There were no significant correlation between CCT and corneal densitometry. Corneal densitometry was found to be significantly correlated with BCVA inthe central 0-2mm zone. This correlation differed in corneal depth, in PK it was with the posterior layer but in DSAEK it was with the anterior stroma These difference were found to be significant between the two group (p<005.).
Conclusions There were different outcomes in the corneal densitometry measurement after different type of corneal transplantation. Oculus Pentacam provides an objective evaluation to monitor the cornea status. Further investigation with prospective design, a longer study period and larger sample size are now underway.

• S052

Semi-fluorinated alkanes for topical delivery of Cyclosporine

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Purpose Cyclosporine A (CsA) is an anti-inflammatory agent that has been frequently used to treat ocular inflammatory conditions, such as dry eye syndrome. However, the poor water solubility of CsA makes it difficult to formulate into an acceptable ocular dosage form. Semi-fluorinated alkanes (SFAs) are a novel class of inert, non-toxic and amphiphilic liquids that form clear solutions with CsA and have been suggested as efficient carriers for topical administration of CsA. The aim of this study was to assess the corneal bioavailability of CsA from SFAs compared to currently marketed formulations.
Methods An ***ex vivo*** porcine eye model was used to study the penetration of a) Restasis® (0.05% CsA ophthalmic emulsion), b) Ikervis® (0.1% CsA ophthalmic emulsion), and c) 0.05% or 0.1% CsA in SFAs. The amount of drug penetrated per gram of cornea between 0.5 to 4 hours after application was assayed by HPLC and statistically compared using a two-way ANOVA. Drug distribution in different layers of the cornea was also visualized by substituting CsA with a lipophilic fluorescent dye and viewing corneal sections under a fluorescent microscope.
Results Significant improvement in corneal penetration of CsA could be observed for 0.05% CsA in SFAs (C1hour = 5,844 ± 2,408 ng/g) over Restasis (C1hour = 761 ± 221 ng/g), with the area under curve (AUC) being more than 8-folds greater. The AUC of 0.1% CsA in SFAs (C1hour = 12,556 ± 4,017 ng/g) was 3.6 folds greater than Ikervis (C1hour = 2900 ± 341 ng/g). Microscopic examinations revealed that the dye incorporated into SFAs tended to accumulate mainly in the corneal epithelium.
Conclusions Overall, this study showed that SFAs can significantly improve the corneal absorption of lipophilic drugs, such as CsA, and could therefore be a promising platform for drug delivery to the eye.

Conflict of interest
Any post or position you hold or held paid or unpaid?:
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Any research or educational support conditional or unconditional provided to you or your department in the past or present?:
Novaliq is financially supporting the research presented
Any financial support like travel accomodation hospitality etc provided to you or a member of your staff or an accompanying person?:
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• S051

Evaluation of the eyelid disorders in the daily ophthalmic practice in 9 European Countries: The MEIBUM* survey

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Purpose To determine the incidence and characteristics of eyelid inflammatory disorders encountered during general ophthalmology consultations in Europe.
Methods Multicenter, epidemiological survey implemented in 9 European countries (2012 – 2014). The participating ophthalmologists were asked to include 10 consecutive patients attending for consultations, no matter what reason for visit. A questionnaire recorded reason for visit, ocular history, symptoms, examination of eyelids and ocular surface, diagnosis of MGD or dry eye, impact on daily life, and management of eyelid disorders.
Results 6,250 patients were recruited from 9 countries; Poland (2584), Spain (1925) Portugal (415), Turkey (398), Germany (375), The Netherlands (230), France (185), Belgium (78) and Denmark (60);mean age was 57.2±17.6. 79.5% of patients presented with at least one ocular problem; the most common presenting symptom was dry eye (29.6%). 77.7% of patients had eyelid disorders. MGD was diagnosed in 53.2% and dry eye in 60.9% of patients. MGD was diagnosed in more than half of the patients with a strong link to dry eye (p-value<0.001). In case of presence of eyelid disorders there was a 52.5% relative risk increase in having dry eye diagnosis. (RR: 1.525: Confidence Interval, CI, 1.424 to 1.632). Among the 3215 patients diagnosed with MGD, 37.3% were classified as having a hyposecretory MGD, 37.3% an obstructive MGD and 38% a hypersecretory MGD. Management included warming (49.5%), cleansing (67.7%), massage (53.6%), and also eye drops for dry eye (81.7%). The impact of eyelid disorder on daily life concerned vision for 56.7%, daily activities/work (53%), leisure (43.1%), and also on emotions (20.6%) and sleep (17.6%).
Conclusions This survey highlights the importance of examining eyelids more closely during routine eye examinations.

Conflict of interest
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• S053

Effects of TRPM8 and TRPV1 agonists on the neural activity of corneal cold thermoreceptors in tear-deficient guinea pigs

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Purpose To characterize the effects of menthol and capsaicin on the activity of corneal cold thermoreceptors in tear-deficient guinea pigs
Methods The main lachrymal gland was surgically removed in anesthetized animals. Four weeks later, cold-sensitive nerve terminal impulse (NTI) activity was recorded from the superfused cornea. The spontaneous and stimulus-evoked NTI activity was analysed. For thermal stimulation, temperature of perfusion solution was changed from 34ºC (basal) down to 20ºC (cooling ramp) or up to 50ºC (heating ramp). TRP agonists (50-200 μM menthol, 1-10 μM capsaicin) were also added to the perfusion solution. The characteristics of the spontaneous and stimulus-evoked NTI activity recorded in tear-deficient and intact corneas before and during perfusion with TRP channel agonists were compared.
Results Removal of the lachrymal gland caused sustained reduction of basal and reflex tearing. NTI activity was significantly higher in cold thermoreceptors from tear-deficient corneas compared with naïve corneas. Response to cooling ramps was also increased. Menthol increased ongoing and stimulus-evoked activity of all cold thermoreceptors in both intact and tear deficient corneas. Menthol at high concentrations first excited and then inactivated cold thermoreceptors. Only 10% of thermoreceptors were activated by capsaicin.
Conclusions Chronic tear deficiency alters the activity of corneal sensory nerve fibers, leading to the development of increased spontaneous activity and abnormal responsiveness to natural stimulation. These changes are particularly prominent in cold thermoreceptor fibers, whose injury-evoked neuropathic firing seems to be due to altered expression of Na+ and K+ channels involved in impulse generation without changes in the activity of TRP channels involved in sensory transduction.

• S054

Cacicol® – neurotrophic keratopathy in systematic review

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Purpose The objective of this study was to review the cases of neurotrophic keratopathy with use of the new regenerating agent (RGTA) therapy Cacicol®.
Methods An analysis was based on documents retrieved from the systematic research on published materials. Bibliometric analysis were performed using own design database. Research has been concentrated on publications, conference abstracts and posters presenting case reports with detailed medical history. Neurotrophic keratopathy patients have been grouped according to diagnosis based on the best assessment of the data presented in the collected materials. In all groups posology, duration of treatment, healing level and tolerance have been assessed by descriptive methods.
Results 58 publications have been consecutively retrieved and reviewed from which 37 have been qualified for further review. In this materials 102 patients with 105 eyes have been selected as detailed data of Cacicol® use, performance and tolerance could be identified. The total number of eyes have been divided into 4 groups: postinfectious (n=33), postoperative (n=25), neurological (n=36), chemical burns (n=11). Analysis revealed that in all groups more than 72% of patients achieved corneal healing/partial healing after average treatment of 4 weeks (from 4 days to 22 weeks). Only 6% of cases did not heal and less than 2% presented unexpected effect.. In the most cases posology covered 1 drop every 2 or 3 days. The recurrence rate of the neurotrophic ulcers after the complete healing was reported up to 20% within 6 months.
Conclusions Cacicol® might be considered as an alternative approach in the neurotrophic keratopathy management. However randomised clinical trial in patients in this indication is necessary to confirm the promising effect of Cacicol® in the neurotrophic keratopathy management.

• S055

Regression of corneal neovascularization associated with corneal epithelial defect after treatment with regenerating agents (Cacicol®)

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Purpose Corneal neovascularization is formed in response to inflammation and hypoxia. It is secondary to different conditions such as herpes simplex stromal keratitis, persistent corneal epithelial defects, contact lens use, keratoplasty of infections.The use of Regenerating Agents (RGTA) is a new treatment that mimics the function of extracellular matrix components. It makes extracellular matrix resistant to inflammatory molecules, restoring the properties and the micro--environment needed for the normal corneal tissue regeneration. We report number of cases showing the role of Cacicol® in the regression of severe corneal neovascularization in patients with neurotrophic keratitis.
Methods Interventional number of cases (N=5) treated with RGTA (Cacicol®) for two months. The patients presented central corneal epithelial defect caused by neurotrophic keratopathy. These defects showed superficial and deep stromal neovascularization. The patients was treated with conventional therapy. We decided to combine this conventional treatment with RGTA (Cacicol®) one every two days for one month. After that period, we spread the dose to once a week for one month more.
Results After first month, we observed that the dimensions of the epithelial defect decreased in two cases and it had disappeared in three cases. After second month, all patients had complete corneal healing and we also observed a regression of superficial and deep stromal vascularization. In three cases, neovascularization had decreased considerably and it had disappeared in two cases.
Conclusions RGTA (Cacicol®) improves corneal melting and epithelial defects associated to corneal neurotrophic pathology. Moreover, in cases with corneal neovascularization associated, we find an important decrease of superficial and deep neovessels.

• S056

Management and treatment of contact lens keratitis

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Purpose Microbial keratitis is an infective process of the cornea with a potentially and serious visual impairments. Contact lenses are a major cause of microbial keratitis in the developed countries especially among young people. Therefore, the purpose of the present study was to evaluate the frequency and microbiological characteristic of contact lens keratitis (CLK) in patients referred to the emergency department of Hospital Clinico Lozano Blesa, Zaragoza
Methods This is a cross-sectional study of all patients with contact lens induced corneal ulcers who were reffered to the Hospital Clinico Lozano Blesa in the last six months. An ophthalmologist examined patients with the slit-lamp and clinical features of them were noted and infectious corneal ulcers were scraped for microbial culture. The contact lenses and their liquid storage were analyzed by microbiology.
Results A total of 18 patients were recuited into the study. The cultures were positive in 36.36% of corneal samples and 80% of culture contact lenses. The most common isolated organism in contact lenses was gram negative bacilli showing cleaning and manteinance system falilure of this type of lenses. Two case of contamination of liquid lenses by fungi were recorded, candida parapsilosis y acremonium spp and two case of contamination by acanthamoeba. The most microorganisms found from the corneal scrapes were gram positive cocci and Pseudomona aeruginosa was the most common gram negative.
Conclusions Due to the percentage of positive results in the cultures of contact lenses is higher than the percentage of corneal scrapings its realization is useful, beacuse the microorganism isolated in the ulcer is also present in maintenance fluids. Due to the high sensitivity of the main microorganisms to quinolones, are recommended as initial empiric therapy in infectious keratitis.

• S057

Topical N-acetylcystein on patients with refractory filamentary keratitis

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Purpose To investigate the effect of topical N-acetylcystein(NAC) on patients with refractory filamentary keratitis.
Methods 29 eyes from 20 patients diagnosed with filamentary keratitis were reviewed retrospectively. The cause, treatment methodology, relief of symptoms, number of filaments, change in fluorescein stains score, degree of healing and relapse of the disease were reviewed.
Results 19 eyes of 14 patients completely healed in average 10.78±8.68 days using drops of topical antibiotics, artificial tears, steroid, serum, cyclosporine, therapeutic lense and punctal plug. After complete remission, one patient with GVHD and two patients with keratoconjunctivitis sicca(KCC) experienced relapse. 10 eyes of 6 patients refractory to the therapy for more than 1 month were additionally prescribed with 10% topical N-acetylcystein(NAC). In average of 60.33±21.11 days, 7 eyes were completely healed and 2 eyes were partially healed. One eye were ceased of 10% topical N-acetylcystein(NAC) due to severe eye irritation.
Conclusions Topical N-acetylcysteine treatment might have some side effect as irritation in the eye, but it could be considered as an effective treatment of refractory filamentary keratitis.

• S058

Comparison of autologous platelet-rich plasma with autologous serum eye drop in corneal epithelial disorder

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Purpose To compare Autologous Platelet-Rich Plasma (PRP) with Autologous Serum Eye Drop(ASED)in corneal persistent epithelial defect.
Methods 35 eyes of 32 patients with persistent epithelial defect at the Khatam_AL_ Anbia eye hospital of Mashhad medical science university between 2012 and 2014 enrolled in the study, randomly. Nineteen eyes treated by PRP and 16 eyes treated by ASED 20%. The treatment applied for patients with persistent epithelial defect that didn't respond to any other conventional therapy. Patients examined before, one week and one month after the treatment. Examination include BCVA , symptoms pain and photophobia), and slit lamp examination including defect size.
Results In PRP-treated group, 9 patients had complete healing, 6 eyes had partial healing and treatment failed in two patients (4 eyes). In ASED group, 6 patients healed completely, 10 patients partially healed and no patient was failed to treat. There was no significant difference in BCVA, pain, photophobia and slit lamp parameters between two groups before and after treatment. The healing rate was faster in PRP group.
Conclusions ASED and PRP both are effective in corneal epithelial defect. This study showed no significant difference between these two medications.

• S059

Free living amoebae (FLA) keratitis

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Purpose To describe the clinical features and treatment results in 41 consecutive patients with microbiologically proven free-living amoebae (FLA) keratitis.
Methods Corneal scrapings from patients with suspected amoebic keratitis were plated on non-nutrient agar. Amoebic isolates were identified morphologically and by polymerase chain reaction (PCR). All patients were treated with polyhexamethylene biguanide (PHMB) 0.02% eye-drops.
Results 41 corneal scrapings from 41 patients were found to be culture-positive for FLA; 39 (95%) were from contact lens (CL) wearers, 2 (5%) from non-CL wearers. Microscopic examination identified 3 ***Acanthamoeba*** spp, 23 ***Hartmannella*** spp, 12 ***Vahlkampfiidae***, and 3 mixed infections with ***Hartmannella***/***Vahlkampfiidae***. Morphological results were confirmed by PCR. Patients with ***Acanthamoeba***, ***Hartmannella*** and ***Vahlkamfiidae*** keratitis had indistinguishable clinical features. In 37 eyes with keratitis at an early stage, treatment with PHMB 0.02% eye-drops was fully successful. In 4 patients with advanced keratitis, topical PHMB 0.02% controlled the infection, but all of them developed a central corneal scar with visual deterioration.
Conclusions ***Acanthamoeba*** is not the only cause of amoebic keratitis, because this condition may also be caused by other FLA, such as ***Hartmannella*** and ***Vahlkampfiidae***. This finding is epidemiologically interesting, suggesting a possible different geographical prevalence of the different FLA responsible for keratitis. Early diagnosis and proper anti-amoebic treatment are crucial to yield a cure.

• S060

Case of conjunctival amyloidosis with repeated subconjunctival hemorrhages

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Purpose Conjunctival amyloidosis is very rare but its presence could be a sign of systemic amyloidosis. This association is important because systemic amyloidosis is a life-threatening disease. We present our ocular and systemic findings in a patient with conjunctival amyloidosis.
Methods A 43-years-old man had repeated subconjunctival hemorrhages for two years and was referred to Chiba University Hospital. He had comprehensive ophthalmological and systemic examinations to determine the cause of the conjunctival hemorrhages.
Results His visual acuities were 1.2 OU, and intraocular pressure was 13-14 mmHg OU. He had central serous chorioretinopathy in the right eye. Magnetic resonance imaging of the eye, orbit, and brain was normal. Initially, the subconjunctival hemorrhage masked a mass lesion. Three months later, the subconjunctival hemorrhage was improved and a grayish white mass was detected in the superior area of the subconjunctiva. Partial biopsy and histopathological examinations showed apple green birefringence and dichroism of amyloid fibers under polarized light. Immunofixation electrophoresis detected l-light chain abnormality but systemic examinations did not find any lesions. Although multiple myeloma was ruled out at that time, the patient is being followed carefully to detect any signs of systemic amyloidosis.
Conclusions Repeated subconjunctival hemorrhage can be an initial sign of systemic amyloidosis. Patients with conjunctival amyloidosis should be comprehensively examined for systemic amyloidosis because of its poor life prognosis.

• S061

Osmoprotective activity of alpha-lipoic acid and taurine on hyperosmolar stress in cultured human corneal and conjunctival epithelial cells

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Purpose To characterize the osmoprotective properties of α-lipoic acid (ALA) alone and in combination with taurine on both human corneal and conjunctival epithelial cells for cell viability and inflammatory biomarkers regulation after hyperosmotic stress.
Methods Human corneal epithelial (HCE) cells and conjunctival epithelial (WKD) cells were incubated in isotonic media and hyperosmolar media (by addition of 100mM NaCl), in the presence and absence of ALA, Taurine and ALA+Taurine. The osmoprotective activity on cell viability after 4h, 8h and 24h of hyperosmolar stress was evaluated by XTT assay. The expression of inflammatory biomarkers in cell-free supernatants was measured using a Human Cytokine 15-plex ELISA Kit after 4h and 8h of stress.
Results The hyperosmolar conditions significantly reduced the cell viability in a time-dependent manner and induced an overexpression of a panel of cytokines in corneal and conjunctival cells. Preincubation of cells with ALA alone or in combination with taurine significantly lowered the cell toxicity induced by the stress. The highest cell viability protection was observed within the range of ALA/Taurine ratios from 0.005 to 0.05 in conjunctival cells. In corneal cells the combination of ALA+Taurine, exhibited a higher osmoprotective effect than ALA or Taurine alone. The expression of cytokines was significantly but differentially reduced by ALA, and ALA+Taurine in corneal and conjunctival cells. The combination of ALA+Taurine exhibited a higher anti-inflammatory effect than ALA or Taurine alone in corneal cells exposed to stress.
Conclusions ALA alone or in combination with taurine, was found to protect against cytotoxicity and inflammation of corneal and conjunctival epithelial cells cultured in hyperosmolar media. ALA may have potential effects in protecting ocular surface epithelia from hyperosmotic stress.

Conflict of interest
Any research or educational support conditional or unconditional provided to you or your department in the past or present?:
Molecules of study provided by Ophtalmis

• S062

Taurine exerts antioxidant and osmoprotecting activity: an in vitro and in vivo study

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Purpose To evaluate the effects of ophthalmic solutions based on sodium hyaluronate (SH) with or without taurine (TAU) in experimental dry eye disease models.
Methods Rabbit corneal epithelial cells (SIRCs) were exposed to oxidative stress (1 mM H2O2) and treated with the following formulations: 0.2% SH, 0.4% SH, 0.4% SH + 0.5% TAU. Reactive oxygen species (ROS) were assessed by commercial kit (ab113851). Dry eye was induced in albino rabbits by topical application (4 times per day) of 1% atropine eye drops. Fifteen minutes after atropine instillation we treated the eyes with test formulations (0.2% SH, 0.4% SH, 0.4% SH + 0.5% TAU). The following endpoints were evaluated: tear breakup time (TBUT), Schirmer's test, ferning test, tear osmolarity. Results were compared to negative (CTR-; normal eye) and positive control groups (CTR+; atropine-treated eye).
Results Taurine significantly ($p<0.01$) quenched ROS production in SIRC after oxidative stress. The effect of taurine, in terms of ROS quenching, was significantly ($p<0.01$) higher compared to SH-treated cells. Topical administration of atropine in the rabbit eye significantly ($p<0.01$) reduced tear volume and TBUT. Ferning test and tear osmolarity were also significantly ($p<0.01$) modified by atropine treatment. All the altered parameters were significantly ($p<0.01$) reversed by 0.4% SH + 0.5% TAU treatment. Furthermore, treatment with SH-TAU formulation was more effective compared to SH formulations.
Conclusions All together these data demonstrated that taurine has a potent antioxidant activity preventing the negative effect elicited by atropine on tear stability. Therefore, our findings support the hypothesis that the formulation containing taurine may be more useful than SH formulations in clinical practice to manage ocular surface diseases related to dry eye.

• S063

The effect of silica nanoparticles on human corneal epithelial cells

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Purpose Silica nanoparticles (SiNPs) are manipulated as potential drug delivery method. Some previous studies focused on the cellular toxicities depending on size and dose. In this study, we analyzed the effect of SiNPs on human corneal epithelial cells (HCECs).
Methods Cell culture-HCECs were purchased from American Type Culture Collection
Treatment of SiNPs-50nm, 100nm and 150nm of SiNPs are provided from Chung-Ang Univ.
Cell Viability Assay-performed using CCK-8 reagent
Lactate Dehydrogenase (LDH) assay-was measured by LDH cytotoxicity detection kit
Measurement of reactive oxygen species (ROS)-detected using OxiSelect In Vitro ROS/RNS Assay Kit
Total Glutathione (GSH) Assay-was measured by OxiSelect™ Total Glutathione Assay Kit
Terminal Deoxynucleotidyl Transferase (TUNEL) assay-performed with APO-BrdU TUNEL assay kit
Western Blot-rabbit anti-LC3B (1:1000), rabbit anti-Beclin1 (1:1000), rabbit anti-pmTOR (1:1000), rabbit anti-mTOR (1:1000), and β-actin (1:10,000).
Results Intracellular and extracellular ROS elevated dose-dependently in all size of SiNPs and, especially, intracellular ROS by 50 and 100nm-SiNPs showed most dramatic increase. Total GSH was also diminished dose dependently in all size of SiNPs. In addition, cellular autophagy was slightly increased as revealed by western blot for LC3A/B. Despite these changes, the cellular cytotoxicity and membrane damage were not observed. Apoptosis of HCEC were not affected by 24h-treatment of SiNPs as shown by flow cytometry, HCEC proliferation was slightly increased by SiNPs. Further analysis about the upper part of signaling cascade, the mTOR pathway was significantly activated in 150nm-SiNPs treated cells unlike other 50 and 100nm size of SiNPs.
Conclusions Our data suggested SiNPs affected cellular ROS and autophagy in HCEC, however, this cellular stress did not influence the viability.

• S064

Subgroup analysis of two phase III studies of 0.1% cyclosporine A cationic emulsion (CsA CE) in patients with dry eye disease

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Purpose Dry eye disease (DED) increases the risk of ocular surface damage, severe keratitis, vision loss and impaired quality of life. In two randomized phase III studies (SANSIKA and SICCANOVE), the cationic emulsion formulation containing 0.1% (1 mg/mL) cyclosporine A (CsA CE) improved ocular damage and inflammation in patients with moderate to [AS1] severe DED. This analysis evaluated the efficacy of CsA CE in improving signs of DED in specific patient subgroups.
Methods Analysis was performed based on efficacy data from the SANSIKA study (N=215) and pooled efficacy data from the SANSIKA and SICCANOVE studies (N=629); change from baseline in corneal fluorescein staining (CFS) at Month 6 was analyzed in subgroups of DED patients defined by age, sex, menopausal status, DED duration (ranging from <4 to ≥12 years) and the presence of Sjögren disease.
Results Of the patients included in the pooled analysis, 65% were <65 years old, 83% were female (72% in menopause) and 38% had Sjögren disease. The overall change in CFS score from baseline to Month 6 favored CsA CE over vehicle (treatment difference −0.303; 95% confidence interval, −0.464 to −0.142). In the SANSIKA study and in the pooled analysis, the effect of CsA CE on CFS score was comparable in patients regardless of age, sex, menopausal status, DED duration and Sjögren disease status. In the subset of patients with severe keratitis, the effect of CsA CE on CFS was also comparable across all subgroups. CsA CE was well tolerated, with a safety profile consistent with ophthalmic CsA use.
Conclusions These data suggest that CsA CE is well tolerated and comparably efficacious in improving signs of DED across multiple DED patient subpopulations.

Conflict of interest
Any consultancy arrangements or agreements?:
A. Leonardi is a consultant for Santen and an occasional consultant for Alcon, Allergan and Sifi. G. Garhöfer is a consultant for Alcon, Allergan, Croma, Santen, and Théa. M. Amrane, J.-S. Garrigue and D. Ismail are employees of Santen SAS. M. Sainz de la Maza reports lecture fees for Alcon and Allergan. M. Labetoulle is an occasional consultant for Alcon, Allergan, MSD, Santen and Théa. All non-Santen SAS authors were investigators in the SANSIKA or SICCANOVE trials.

• S065

Macular OCT features in eyes with VKH disease

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Purpose To describe choroidal and retinal patterns evaluated with SD-OCT in patients with Vogt-Koyanagi-Harada (VKH) disease.
Methods We included all patients with VKH disease according to the international workshop on VKH and referred to Pitie-Salpetriere Hospital between December 2014 and June 2015, for whom SD-OCT was performed. Data collection consists of assessing the best corrected visual acuity (BCVA), the dosages of corticosteroids and immunosuppressors as well as the description of retinal and choroidal thickness and architecture.
Results Thirty eyes of 15 patients, 12 females and 3 males, with an average age of 44.5 years were included. The main uveitis follow-up was 7.1 years. Two thirds of uveitis cases were chronic. The mean VA was 0.42 logMar. OCT features were macular edema (16.7%), external limiting membrane disruption (36.7%), atrophy of nuclear layers (13.3%), ellipsoid line disruption (36.7%), retinal pigment epithelial hyperplasia and atrophy (26.7% and 16.7%), serous retinal detachment (16.7%), choroidal folds (13.7%), Sattler's and Haller's layers disorganisation (60% and 43%). Retinal and choroidal thicknesses were 259.3 µ and 325.1 µ respectively. The proportion of eyes with ellipsoid disruption, pigment epithelium atrophy and alterations of choroidal layers was more important in the group of eyes with VA superior or equal to 0.4 logMar. Uveitis duration in the first group was superior compared to the second group (5.2 vs 11.2 years). The degree of inflammation, based on laser flare meter values, was similar.
Conclusions Severe retinal damages seem not to be so common and are frequently associated with poor visual acuity. Haller and Sattler layers alteration are common in acute and chronic cases of VKH disease. Starting rapidly corticosteroid treatment or/ and immunosupressors is necessary to avoid these irreversible damages.

• S066

Evolution of spectral-domain optical coherence tomography images in an acute stage of Vogt-Koyanagi-Harada disease

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Purpose Vogt-Koyanagi-Harada (VKH) disease is a rare granulomatous inflammatory disorder that affects pigmented structures, such as eye, inner ear, meninges, skin and hear. It is mainly a Th1 lymphocyte mediated aggression to melanocytes after a viral trigger in the presence of HLA-DRB1*0405 allele. The disease has an acute onset of bilateral blurred vision preceded by flu-like symptoms. Prompt diagnosis followed by early, aggressive and long-term treatment with high-dose corticosteroids is critical for a good visual prognosis.
Methods We present a case of a 55-year-old woman with a 12-hours history of bilateral central blurred vision accompanied with oppressive headache for the past 5 days. Best-corrected visual acuity (BCVA) was counting fingers in both eyes. Slit-lamp biomicroscopy evaluation and Goldmann applanation intraocular pressure (IOP) were normal.
Results Funduscopic examination and spectral-domain optical coherence tomography (SD-OCT) revealed bilateral optic disc swealling and multiple focal areas of exudative retinal detachment, including macular detachment. Combined with cerebrospinal fluid pleocytosis, this patient was diagnosed with VKH disease and was treated with intravenous methylprednisolone followed by oral prednisolone which was then gradually tapered. SD-OCT were performed upon initial presentation and at 5-days and 1-month follow-up. Retinal signs resolved two months following treatment and BCVA was 20/25 in both eyes.
Conclusions Focal areas of subretinal fluid are usually present at the beginning of VKH disease. SD-OCT has a significantly importance in the early detection of these areas and follow-up of the disease.

• S067

Changes of central macular thickness and retinal nerve fiber layer thickness in eyes with Vogt-Koyanagi-Harada disease: a 2-year follow-up study

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Purpose To prospectively investigate the change in central macular thickness (CMT) and retinal nerve fiber layer (RNFL) thickness in eyes with Vogt-Koyanagi-Harada (VKH) disease in through 24 months follow-up.
Methods Twelve eyes of 6 treatment-naïve patients with acute VKH disease associated with optic disc swelling and serous retinal detachment and 30 eyes of 15 normal individuals were enrolled to investigate the changes of CMT and average RNFL thickness. Retinal thickness were measured at first visit and months 6, 12 and 24 via spectral domain optical coherence tomography (SD-OCT).
Results CMT was significantly lower in the eyes of VKH group at 12 (246.58 ± 21.80 µm vs 258.60 µm ± 15.61, $p<0.05$) and 24 months visit (226.67± 14.21 µm vs 253.15 ± 15.84 µm, $p<0.05$). RNFL thickness was significantly higher in the eyes of VKH group at initial visit, 6 and 12 months follow-up visit, but no significant difference between VKH group and control group at 24 months follow-up visit(95.83 ± 14.85 µm vs 97.14 ± 12.97 µm, $p>0.05$).
Conclusions There were significant changes of CMT and RNFL thickness in the eyes with VKH disease during 24 months follow-up period. Detecting or monitoring diseases including glaucoma and neuro-ophthalmic diseases, which affect the retinal thickness in VKH patients, we recommend to consider the longitudinal change of the retinal thickness.

• S068

Ocular manifestations in dengue fever

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Purpose Dengue fever, a viral disease epidemic in some parts of the world, caused by a virus, is characterized by fever, headache, muscle and joint pains. Ocular manifestations are uncommon, but of great significance. Main symptoms include blurring of vision, scotomata, metamorphopsia, and floaters. We describe the clinical spectrum of fundus manifestations and angiographic, optical coherence tomographic and electrophysiology features of dengue- associated maculopathy in few patient.
Methods We reviewed clinical records and report 6 serial cases of ophthalmic complications resulting from dengue infection. Serology was positive in 100%. Investigations included Humphrey automated visual field analyzer, optical coherence tomography, fundus fluorescein and indocyanine green angiography, and electrophysiology.
Results 12 eyes of 6 patients, 5 women and 1 man, were studied. The mean age was 26.8 years.The mean log MAR presenting best corrected visual acuity was 0.53 (range of 1 to counting fingers). Multiple retinal yellowish deposits at fovea were an usual finding in 9 eyes. Of these, optical coherence tomography (OCT) showed focal disruption of the outer neurosensory retina in 8 eyes, and indocyanine green angiography corresponding hypofluorescent spots in 3 eyes. Intraretinal hemorrhage was seen in 1 eye, in association with an artery sheathing. In this case, OCT showed a thickening of the inner retina, the result of retinal arteriolar occlusion. Central or paracentral scotomas were observed in 83%. Multifocal electroretinography showed decreased foveal and parafoveal responses. Final visual acuity increased while relativ scotoma remained.
Conclusions Ocular damage in Dengue fever are extremely varied and all examinations are needed to better characterize the lésion and thus assess the best visual prognosis of often young and active patients.

• S069

Evaluation of choroidal changes in patients with ocular toxoplasmosis using spectral domain optical coherence tomography

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Purpose We aimed to examine the choroidal changes in ocular toxoplasmosis with spectral domain optical coherence tomography (SD-OCT) using the enhanced depth imaging (EDI) mode.
Methods The clinical and laboratory data and SD-OCT images of patients with ocular toxoplasmosis admitted to Dicle University Ophthalmology Department were analyzed retrospectively. The demographic properties as well as the outcomes of visual acuity, intraocular pressure, biomicroscopic findings and dilated fundus examination were noted. The patients were categorized into three groups: active toxochorioretinitis (TCR), inactive TCR and healthy controls. EDI-OCT images of lesions and choroid in the subfoveal region were obtained in patients with active and inactive TCR; while only the EDI-OCT images of choroids in subfoveal region were obtained in the control group.
Results A total of 54 subjects were evaluated including 20 individuals in the control group (7 male,13 female), 10 patients in active TCR group (8 female,2 male) and 24 patients in inactive TCR group (16 female, 8 male) . The study groups were comparable in terms of age, gender and intraocular pressure (p=0.862, p=0.682, p=0.841). The best corrected visual acuity (logMAR) was significant lower in active TCR group compared to controls (p=0.003). The best corrected visual acuity and average choroid thickness in the subfoveal region were significantly lower in the inactive TCR group compared to control group (p=0.001). The average choroid thickness in lesion region was found significantly thicker in active disease compared to inactive ocular toxoplasmosis (p=0.001).
Conclusions Monitoring of choroid is possible by EDI technique of SD-OCT. This method is easily applicable and beneficial in the examining of ocular toxoplasmosis.

• S070

Ocular candidiasis in intravenous drug misusers

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Purpose To study the characteristics, the management and evolution of ***Candida*** endophthalmitis among intravenous drug misusers in the era of new systemic antifungal agents.
Methods Retrospective, descriptive study of patients with ocular candidiasis performed at Pitié-Salpêtrière hospital, Paris, France, from 2002 to 2015.
Results 12 patients (14 eyes) had fungal endophthalmitis associated with drug misuse. Mean age at diagnosis was 41.1 years old and 83% of patients were male. Misuse of buprenorphine and morphin sulfate were noted in 83% and 17% respectively. 50% had polymedications. The way of infection was 50% hand transmission and 50% salivary transmission. Many of them had systemic co-infections: hepatitis B,C , D or Human Immunodeficiency Virus. Patients presented with chorioretinitis (50%), endophthalmitis (57%) or both (36%). The microbiological diagnosis was obtained from anterior chamber tap (50%), vitrectomy (57%), skin, hair or mouth sample (7% each). 36% of the samples were positive and gave a fungal identification (75% positive for Candida albicans; 25% positive for Candida tropicalis and dubliniensis). At diagnosis of endophthalmitis, mean visual acuity was 0.9 log MAR and 0.3 logMAR after resolution of endophthalmitis. Patients received fluconazole (50%), voriconazole (42%) or amphotericin B (8%), associated with intravitreal injections of amphotericin B (50%) or vitrectomy (50%). Mean time of treatment was 2 months.
Conclusions Fungal endophthalmitis is a sight-threatening disease most commonly caused by ***Candida*** species. It is important to maintain a high index of suspicion of ***Candida*** ocular infection, particularly among intravenous drug users, even if they have drug substitution. Infection is mostly due to the preparation process. An early treatment based on antifungal agents highly improve the visual prognosis.

• S071

In vitro activity of Cacicol® on herpes simplex virus type 1 : a promising adjunct therapy of herpetic corneal infections ?

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Purpose Herpes simplex keratitis (HSK) remains the leading cause of infectious blindness in developed countries. Cacicol®, a topical eye biopolymer containing a poly-carboxymethyl sulfate solution is a recent licensed regenerating agent used for matrix repair therapy, intended for wound healing of corneal epithelial defects. According to its chemical composition, we hypothesized that Cacicol® could compete with natural heparan sulfate which initiates cell surface attachment of herpes simplex virus type 1 (HSV-1) and that Cacicol® could have unexplored antiherpetic activities.
Methods Cacicol® was tested in vitro against both cell free HSV-1 SC16 strain and HSV-1 PSL-R, a clinical isolate resistant to both acyclovir and foscarnet due to mutations in both thymidine kinase and DNA polymerase, and compared to the activity of vehicle, equivalent to active drug minus the active component. The reduction of the initial viral inoculum by Cacicol® or vehicle, during one hour adsorption was determined by plaque reduction assays on Vero cells.
Results A dose dependent effect was demonstrated when both SC16 and PSL-R were pre-treated with Cacicol® during adsorption. Initial inoculums of 1.104 PFU were significantly decreased to 160 PFU (± 26.6) and 117 PFU (± 22.3) for SC16 and PSL-R respectively, while vehicle has no effect on viral replication.
Conclusions Cacicol® has a significant in vitro antiherpetic activity and seems particularly interesting for the management of HSV-1 resistant to acyclovir or foscarnet, especially in tissues that can receive Cacicol® by topical application (such as the cornea). Clinical studies are necessary to determine its in vivo activity and its usefulness as a promising adjunct or alternative therapy of recurrent HSK.

Conflict of interest
Any consultancy arrangements or agreements?:
THEA
Any research or educational support conditional or unconditional provided to you or your department in the past or present?:
THEA
Any financial support like travel accomodation hospitality etc provided to you or a member of your staff or an accompanying person?:
THEA

• S072

Modern aspects of demodex blepharitis treatment

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Purpose The aim of conducted study was to evaluate the modern eyelid hygiene procedures effectiveness in treatment of demodex blepharitis.
Methods Sixty patients with blepharitis and proved presence of Demodex mites were randomized into two groups: Group 1 (n=30) received the standard treatment of blepharitis (antimicrobial, anti-allergic, non-steroidal therapy, artificial tears as required); Group 2 received the standard treatment in complex with eyelid hygiene procedures twice a day during at least one month: applying sterile wipes (Blephaclean®, Thea), warm compresses and eyelid massage. Effectiveness of treatment for each patient in both groups was assessed by means of subjective daily 3-grade scale of patient's comfort, and objective 3-grade scales: level of eyelids edge inflammation daily, condition of tarsal glands by meibomiography weekly, presence of Demodex mites, eggs, larvas in acarogramm every 2 weeks.
Results There was no significant difference in the average general grade of the clinical complaint between the groups at baseline. Both groups improved clinically with treatment but the subjective level of comfort was greater and appeared sooner in Group 2. By day 3, the grade of clinical complaints was significantly lower in Group 2 compared to Group 1 (1.3 vs 2.6, $p<0.05$). Similar average level (1.3) was gained in Group 2 only to 7th day. Redness and eyelid swelling reduced for at least 80% of subjects after 14 days in Group 1, but after only 10 days in Group 2. After 3 months Demodex specimens were still found in 28 (46.7%) patients in Group 1, but only in 10 (16.7%) in Group 2. There were no significant visual functions changes in both groups of patients during all follow-up period.
Conclusions The study demonstrated the important advantages of comprehensive eyelid hygiene procedures in addition to standard therapy of demodex blepharitis.

Conflict of interest
Any financial support like travel accomodation hospitality etc provided to you or a member of your staff or an accompanying person?:
Yes, for participation to EVER congress by THEA.

• S073

Unilateral painful external ophthalmoplegia as the first manifestation of combined anterior and posterior scleritis

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Purpose Posterior scleritis (PS) is a rare form of ocular inflammation. It can be idiopathic or associated with systemic disorders in 40%–50% of cases. PS is characterized by several different clinical manifestations like severe pain especially during eye movements and in some cases decreased vision. It can include changes in choroid, retina and optic nerve and associate anterior scleritis. We present a case of unilateral painful ophthalmoplegia as the first manifestation of combined anterior and posterior scleritis.
Methods An otherwise healthy 55-year-old man complained with acute diplopia and painful ophthalmoplegia in his left eye. Findings on examination were conjunctival quemosis, moderate hyperemia and limitation of ocular movements in all directions. Best-corrected visual acuity (BCVA) was 20/20 in both eyes. Goldmann applanation intraocular pressure was 18 mmHg in right eye and 28 mmHg in left eye. Fundus examination was normal. Contrast-enhanced CT scan showed marked anterior and posterior scleral thickening of the left eye. In the systemic examination, routine blood tests, autoimmune and infectious markers were normal.
Results Treatment was initiated with oral prednisolone 1 mg/ kg/ day. After 7 days, the patient´s signs and symptoms had improved. Following one month of treatment scleritis had disappeared. One year later, the patient is asymptomatic without any recurrences.
Conclusions Opthalmologist should be aware of the possibility of a misdiagnosed posterior scleritis in a patient with clinical settings of anterior scleritis like diplopia or ophthalmoplegia.

• S074

Comparison of several transport activities of lens epithelial cells from cataract and healthy dog

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Purpose The aim of this study is to compare the transport activities between normal and cataract lens epithelial cells.
Methods The primary lens epithelial cells of healthy and cataract dog were transfected with the expression plasmid DNA of large T antigen from replication origin-defective simian virus 40 (SV40), then cloned using a glass cylinder. The transport activities of glycine, cysteine, glutamate, arginine, leucine, carnitine, ascorbic acid and glutathione were investigated using two cell lines.
Results There was no significant difference in transport activity between the two cells lines except for glutamate. Glutamate transport activity was 20% lower in cells from cataract than healthy one.
Conclusions Reduced glutamate transport activity may contribute to the pathogenesis of canine cataract.

• S075

Exposure to subthreshold dose of UVR-B induces apoptosis in the lens epithelial cells and does not in the lens fiber cells.

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Purpose The purpose of this study is to investigate which part of the lens in vivo exposure to subthreshold dose of UVR-B induces apoptosis in.
Methods Twenty 6-week-old female albino Sprague-Dawley rats were exposed to subthreshold dose (1 kJ/m2) of UVR-B unilaterally and sacrificed at 120 h after exposure. Lenses were enucleated and dissected on three regions: the lens epithelium, the cortex and the nucleus. The lens nucleus then was removed. Apoptosis markers p53 and caspase 3 were used to study apoptosis in the lens epithelium and the cortex. qRT-PCR and Western Blot were utilized to analyze the lenses.

Results TP53 and CASP3 mRNA expressions are increased in exposed lenses, both in the lens epithelium and the cortex regions, in relation to non-exposed lenses. Expression of p53 protein is increased in exposed lens epithelium in relation to non-exposed lens epithelium. Caspase 3 protein is expressed in exposed lens epithelial cells whereas it is not expressed in non-exposed lens epithelial cells. p53 and caspase 3 proteins are not expressed in either exposed or non-exposed lens fiber cells.
Conclusions Exposure to UVR-B increases mRNA transcription of apoptosis marker p53 in vivo in both regions of the lens and of apoptosis marker caspase 3 in the lens cortex. Exposure to UVR-B increases p53 and caspase 3 proteins' expression in the lens epithelium. In vivo exposure to subthreshold dose of UVR-B induces apoptosis in the lens epithelial cells and does not in the lens fiber cells.

• S076

Prevention and reversal of selenite-induced cataracts by N-acetylcysteine amide in Wistar rats

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Purpose The present study sought to evaluate the efficacy of N-acetylcysteine amide (NACA) eye drops in reversing the cataract formation induced by sodium selenite in male Wistar rat pups.
Methods Forty male Wistar rat pups were randomly divided into treatment groups. Cataracts were evaluated at the end of week 2 (postpartum day 14) when the rat pups opened their eyes. NACA eye drops were administered beginning week 3 till the end of week 4 (postpartum days 15 to 30) and the rats were sacrificed at the end of week 4. Lenses were isolated and examined for oxidative stress parameters such as glutathione, lipid peroxidation, and calcium levels along with the glutathione reductase and thioltransferase enzyme activities. Casein zymography and Western blot of m-calpain were performed using water soluble fraction of lens proteins.
Results Morphological examination of the lenses in the NACA-treated group indicated that NACA was able to reverse the cataract grade. In addition, glutathione (GSH) level, thioltransferase (Ttase) activity, m-calpain activity, and m-calpain level (as assessed by Western blot) were all significantly higher in the NACA-treated group than in the Na2SeO3-induced cataract group. Furthermore, sodium selenite injected rat pups had significantly higher levels of malondialdehyde (MDA), glutathione reductase (GR) enzyme activity, and calcium levels, which were reduced to control levels upon treatment with NACA.
Conclusions NACA has the potential to significantly improve patient health and the clinical care of cataracts. Further development of pharmacological agents like NACA may eventually help ophthalmologists prevent cataract formation in high-risk populations and non-surgically treat early stage cataracts, producing favorable patient outcomes while decreasing medical costs.

• S077

A dual therapeutic approach for the reversal of cataracts

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Purpose Over 20 million people suffer from cataracts worldwide. Currently, surgery is the only effective treatment for this condition. Although cataract surgery is routine and generally considered safe, it is neither feasible nor accessible for much of the world's population. Thus, there is a high demand for an effective topical treatment that can reverse or prevent cataracts in those for whom surgery is not a viable option. Clouding of the lens is caused by the aggregation of water-soluble crystallin proteins. Crystallins are a major component of the lens and allow it to refract light. Crystallins are rich in sulfur-containing amino acids, which are susceptible to the formation of disulfide bonds upon oxidative damage. This damage results in protein misfolding and aggregation. Thiol antioxidants have the potential to protect these proteins from oxidative damage and to prevent the formation of cataracts. α-Crystallins act as chaperons for other crystallin isoforms, binding damaged β- and γ-crystallins and impeding aggregation. Recently, sterols such as lanosterol and 25-hydroxycholesterol have demonstrated the ability to stabilize the healthy, functional α-crystallin structure, which preserves the anti-aggregation action of these chaperons. The objective of this study was to determine additive and/or synergistic effects of a thiol antioxidant in combination with 25-hydroxycholesterol to combat crystallin aggregation in two ways: protecting crystallin thiol residues and bolstering α-crystallin chaperon activity.
Methods To investigate thiol antioxidant candidates for incorporation into a topical cataract treatment, an ***ex vivo*** model using Wistar rat pup lenses was employed. Various thiol antioxidants were examined for their ability to reverse cataracts when used in combination with 25-hydroxycholesterol.
Results To be discussed.
Conclusions To be discussed.

• S078

Human anterior lens epithelium in presenile cataract- scanning and transmission electron microscopy study

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Purpose Presenile cataracts, including juvenile and congenital cataract, are rare. As a presenile cataract is considered a subcapsular senile cataract in a person under 45 years of age. Clinical examination before the cataract surgery showed the subcapsular changes in the opacity on the anterior lens. The purpose was to study the structure of the lens epithelial cells (LECs) of presenile cataract in order to investigate possible structural reasons for its development.
Methods The anterior lens capsule (aLC: basement membrane and associated lens epithelial cells) were obtained from cataract surgery and prepared for scanning electron microscopy (SEM) and transmission electron microscopy (TEM).
Results We present the results of the SEM and TEM study of the anterior lens epithelium. The most prominent abnormal features observed by SEM for all studied presenile cataract patients were the changes of the LECs structure with the dents on the apical side centrally toward the nucleus. The individual LECs or smaller regions of lens epithelium are damaged with the several lesions of this type that are present diffusely. TEM also showed the thinning of the lens epithelium with the segmentally concave cells and the compressed and elongated nucleuses.
Conclusions Abnormal, distinguishable structural features were observed in the anterior lens epithelium LECs in presenile cataract patients. Disturbed structure of LECs may play a role in water accumulation in the presenile cataract lens. We suggest that the presence of LECs with damaged nucleuses may be associated with the genetic/congenital origin of the presenile cataracts.

• S079

Composition of phacoemulsificated human lenses analyzed by infrared spectroscopy

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Purpose Phacoemulsification is one of the most popular techniques of treating cataract. During the surgery the vibrating phaco-probe emulsifies the lens into pieces that are vacuumed into a cassette. Afterwards the shredded lens material is usually disposed. Currently spectroscopic methods are ordinarily applied for studying biological materials due to their high sensitivity, reliability and non-destructive character. The study attempts to determine whether the infrared spectroscopy technique is appropriate to reveal the differences in the structure of the lenses, especially focusing on the content of substances indicating changes in the secondary protein structure or mineralization process.
Methods In the study 99 randomly selected dispersed human lenses were analyzed. The procedures of phacoemulsification were performed at the Military Hospital in Cracow and Military Institute in Warsaw. Obtained shredded lenses were forwarded to the Institute of Nuclear Physics at Polish Academy of Sciences in Cracow for further investigation. After appropriate preparation, the material was analyzed by FTIR spectroscopy using Nicolet spectrometer equipped with DTGS detector and ATR attachment. For the accurate interpretation of the spectra of lenses, exemplary samples of albumin, DNA, glucose and hydroxyapatite were also analyzed.
Results The FTIR spectra of lenses are characteristic for natural tissues and are dominated by intense bandwidth derived from amides and lipids. The FTIR spectra of the lenses are most similar to the spectrum of albumin.
Conclusions The material obtained during phacoemulsification is suitable for infrared spectroscopic investigation. The FTIR method allows for the determination of human eye lenses structure and enables to indicate the differences in their composition.

• S080

Ocular tolerance in rabbits of intracameral administration of Mydrane, a fixed combination of tropicamide, phenylephrine, and lidocaine for cataract surgery

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Purpose Preclinical studies have been done to evaluate the ocular tolerance of MYDRANE (tropicamide 0.02%, phenylephrine 0.31% and lidocaïne 1%) after a single intracameral (IC) injection in rabbits.
Methods 60 pigmented rabbits were divided in 3 groups of 10 animals by injection volume (100 µL or 200 µL of MYDRANE or 0.9% NaCl). One group injected with MYDRANE and the group injected with NaCl had their anterior chamber rinsed with NaCl, 1min after IC injection. This wash was not performed for the second MYDRANE-group in order to extend the presence of the product in the anterior chamber well beyond what is expected in clinical use. Animals were held in observation for 7 days. The following evaluations were performed: general tolerance, slit-lamp observations, laser flare, cornea thickness , cell density of the corneal endothelium, electroretinography. After euthanasia, eyes were sampled for histology.
Results MYDRANE was very well tolerated with or without rinsing. Very slight conjunctival effects were observed for 3 or 4 animals from groups after 200 µL-injection and very slight corneal vascularization was observed for one animal from NaCl-group. Inflammation in the anterior chamber was mainly observed in the eyes who were rinsed and this inflammation decreased in the course of time. Iris, fundus and lens were normal, except for 4 animals in whom a needle impact was observed on the lens, probably due to rinsing. In addition, whatever the group, cornea thickness, endothelium cell density, electroretinography parameters and ocular histology were not affected.
Conclusions Following IC injection of 100 or 200 µL of MYDRANE, which is the maximal injectable volume in rabbits, the ocular tolerance of MYDRANE was very good for 7 days and the ocular effects observed were attributed mainly to the method of injection and to the rinsing.

Conflict of interest
Any post or position you hold or held paid or unpaid?:
Employee of Laboratoires THEA

• S081

Weill-Marchesani syndrome: displaced lens, displaced pupil, displaced diagnosis

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Purpose Weill-Marchesani Syndrome (WMS) is a rare, multi-system, connective tissue disorder characterised by short stature, brachydactyly and ocular disturbance in late childhood. The cardinal ophthalmic feature is a microspherophakic lens which commonly results in lens subluxation, lenticular myopia, cataract formation and chronic glaucoma. Corectopia is a finding associated with lens subluxation but can also be a complication of ocular surgery. Until now, there are no reported cases of corectopia in WMS.
Methods We describe the case of a 26-year-old female who presented with progressive blurring of vision on a background of high myopia, glaucoma and bilateral cataracts. The patient had undergone multiple procedures to control intraocular pressures, including bilateral trabeculectomy and glaucoma valve insertion in the left eye. She was diagnosed with WMS two years ago, but was lost to follow up.
Results Examination revealed inferior subluxation and opacification of the lens bilaterally. Interestingly, the left pupil was displaced nasally and corneal bullae were noted on the inferior surface of the left eye. She was listed for bilateral phacoemulsification and intraocular lens insertion following this consultation, however re-presented with sudden deterioration in vision within one week. Her right lens was displaced anteriorly but there was no corneal oedema. She subsequently underwent emergency lensectomy and was left aphakic in that eye.
Conclusions WMS often goes undiagnosed in childhood. A greater awareness of the presenting features of the condition is important for early recognition and referral onto secondary care for specialist ophthalmic input. Our experience demonstrates that screening for complications is of paramount importance and early lensectomy may prevent irreversible ocular damage and improve visual outcomes.

• S082

Comparison of visual and refractive outcomes after implantation of a new diffractive trifocal toric lens, a trifocal lens and a monofocal toric lens

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Purpose To evaluate a diffractif trifocal toric intraocular lens (IOL) comparated with a trifocal IOL and a monofocal toric IOL.
Methods This retrospective comparative study included patients with visually significant cataract or presbyopia who were scheduled for lensectomy and implantation of IOL. They were included in 3 groups according to the IOL implanted: multifocal group, multifocal toric group and toric group. At 1 month postoperatively, visual acuity (VA) at long and near distance, and refractive outcomes were examined.
Results 70 eyes of 45 patients were included. 21 eyes in the multifocal group, 22 in the multifocal toric group, and 27 in the toric group. The mean age of patients was 70,7 years +/- 10,6 (range 52 to 91 years). Postoperatively, the mean refractive astigmatism decreased to 0,71D, 0,77D and 0,72D respectively in the 3 groups. The distance uncorrected VA was 0,13logMar +/- 0,11 for multifocal group, 0,13logMar +/- 0,16 for multifocal toric group and 0,12logMar +/- 0,11 for toric group. There were no statistically differences between the 3 groups for the uncorrected distance VA, and between multifocal group and multifocal toric group for the uncorrected near VA.
Conclusions Diffractif trifocal toric IOL provided useful VA at any distance. The addition of a toric surface to the aspheric diffractive multifocal IOL resulted in a comparable visual performance.

• S083

Clinical features of cataract extraction with negative power intraocular lens implantation in high myopia patients

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Purpose To evaluate the clinical features of high myopic eyes with cataracts implanted with negative power intraocular lenses (IOLs) at the time of cataract surgery.
Methods A retrospective chart review was conducted of 18 eyes of 14 patients who underwent cataract surgery with negative power IOLs and 10 eyes in 9 patients with low power IOLs. We investigated axial length, IOL power, preoperative and postoperative best-corrected visual acuity (BCVA) and preoperative and postoperative spherical equivalent (SE) refractive errors.
Results Mean BCVA showed significant improvement in both groups. We measured postoperative SE refraction and the difference between the mean intended and the mean achieved SE refractive errors in the negative power group (17 eyes) was +1.59 ± 1.34 D and +0.31 ± 0.50 D in the low power group.
Conclusions BCVA was significantly improved in the majority of eyes, although they had myopic macular degeneration or posterior staphyloma. However, the mean achieved postoperative SE refraction was more hyperopic than the predicted postoperative SE error. Additionally, hyperopic refractive error was greater in the negative power group than the low power group. Therefore, we recommend that postoperative hyperopic refractive error should be considered when performing cataract surgery in high myopic patients.

• S084

Implantable Collamer Lens to treat high myopia : efficiency and safety

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Purpose To report the efficiency and safety of Posterior Phakic Lens ICL (Implantable Collamer Lens), implantation for treating high myopia.
Methods This retrospective observational monocentric study included 23 eyes of 12 patients who underwent consecutive V4 model ICL implantations between January the 1st 2015 and december 31th 2015. The lenses power were between 7.25 and 18.75 (D) Main outcomes mesures were uncorrected and corrected distance visual acuities, refraction for the evaluation of efficiency, endothelial cell count, intraocular pressure and pupillary diameter. Anatomical results were reported by anterior chamber OCT, biometrics and ICL vault.
Results At 3 months post operatively, uncorrected distance visual acuity improved from 0.05 to 0,9+/- 0,1 (Monoyer scale) (p< 0,001). The mean spherical equivalent decreased from - 9,4 +/- 3,4 (D) to - 0,6 +/- 1,9 (D) after surgery. The mean post operative vault was 660 +/- 280 µm. There was no significant difference in endothelial count (p= 0,06), intraocular pressure (p= 0,22), pupillary diameter (p= 0,10) and anterior chamber angle depth (p< 0,001) pre and post operatevely. Furthermore, 100% of patients were satisfied and would recommended ICL implantation, despite of 40% of them reported halos and night vision problems.
Conclusions This study indicates that ICL implantation provides refraction safety and efficiency to treat high myopia ineligible for lasik. Patients have to be throughly selected and well informed of possible complications before surgery.

• S085

Outbreak of fungal endophthalmits following cataract surgery

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Purpose To report clinical features, microbiology, and treatment outcomes of fungal endophthalmitis following cataract surgery
Methods The medical and cytopathologic records of all patients treated by the retina specialists at Nune Eye Hospital (Seoul, Korea) between May, 2014 and February, 2016 were retrospectively reviewed.
Results Total 13cases of 12 patients transfer to our hospital for management of endophthalmitis following cataract surgery at one local clinic between April 8, 2014 and May 15, 2014. A presenting best corrected visual acuity(BCVA) was various (range, hand motion – 20/40). Surgical managements include vitrectomy, capsulectomy, IOL removal and pre and postoperative intravitreal cocktail (vancomycin, ceftadizime with or without dexamethasone and voriconazole) injection were done. Fungal elements of were detected by direct microscopy in all patients. The final visual outcomes were as follows: 10 of 13 cases achieved ≥ 20/100 which same or better VA than at the first visit. However 3 of 13 cases resulted in poor VA because of enucleated due to uncontrolled inflammation and retinal detachment(RD), macular hole with RD and corneal ulcer in spite of good surgical outcome, respectively.
Conclusions Fungal endophthalmitis following cataract surgery is rare but could occur. Therefore the possibility of fungal infection should always keep in mind when postoperative intraocular inflammation occurred. Also, fungal endophthalmitis could occur collectively. If fungal endophthalmitis is suspected or diagnosed, surgical management including IOL removal, total capsulectomy and exhaustive anterior vitrectomy should be performed as soon as possible and long term postoperative management including intravitreal injections and systemic treatment of antibacterial and antifungal agents may thought to be helpful in achieving a good visual outcome.

• S086

Eleven year review of risk factors and visual outcomes of patients with posterior capsule rupture (PCR) as a complication of cataract surgery at a district general hospital

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Purpose To report risk factors and visual outcomes of cataract surgery complicated by posterior capsule rupture (PCR) at Portsmouth Hospital over an 11 year period (2004-2015)

Methods A search of all cataract surgery complicated by PCR was performed on our Electronic Patient Record (EPR). Clinical data was extracted from the EPR, patient case notes and clinical letters. Only patients with a minimum of 3 months VA recorded were included.

Results In total 366 patients were identified. The mean number of cataract operations performed per year was 3832 giving an overall PCR rate of 0.98%. Of the cases affected the average age was 74 years and 56% were female. The most common risk factors were dense cataract (15%), high myopia (8%) and previous vitrectomy (6%). Thirty five percent of PCR cases occurred during a trainee surgical list. Initial mean best corrected VA in all patients was 0.68, 0.62 at 3 months and 0.46 at 1 year. The mean length of follow up was 35 months and the mean VA was 0.36 at the final visit.

Conclusions PCR rate at Portsmouth is almost half the national rate. We found in our cohort of patients, previous vitrectomy was a common risk factor which was not reflected in the Royal College of Ophthalmologists' National Database. Over a third of PCR occurred during trainee lists, emphasising the need for risk stratification preoperatively to identify difficult cases.

• S087
BAP1 germline mutations in uveal melanoma patients without family history of eye cancer

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Purpose Germline pathogenic variants of the BRCA-1 associated protein-1 (*BAP1*) gene predispose to uveal melanoma and several other cancers. Testing for germline *BAP1* mutations should be performed if typical BAP1 cancer predisposition syndrome tumors have been diagnosed in the family. We report the frequency of germline pathogenic variants of *BAP1* in consecutive Finnish uveal melanoma patients without known history of eye cancer.
Methods In Finland, uveal melanomas are treated centrally in the Ocular Oncology Service, Helsinki University Hospital. We collected clinical data and genomic DNA from 239 of 389 consecutive patients diagnosed from January 2010 to December 2015. Patients with verified family history of eye cancer were excluded. Fifteen patients had died before the study started and could not be sampled. The exons and exon-intron junctions of *BAP1* were sequenced.
Results We found only one probable pathogenic germline variant, a donor splice site mutation in a highly conserved region immediately after exon 2 in a 57-year-old male patient. Three of his family members had been diagnosed with typical BAP1-related cancers (cutaneous melanoma, mesothelioma, and renal cell carcinoma). The mutation was not found in 61,486 controls from the ExAC (http://exac.broadinstitute.org). The frequency of germline BAP1 mutation in patients without any family history of eye cancer was 0.4% (1/239, 95% CI 0.01 to 2.2).
Conclusions The frequency of BAP1 germline pathogenic variants in the Finnish patients with uveal melanoma without family history of ocular cancer is low. The family history of typical BAP1-related cancers was informative, and should routinely be obtained to guide the *BAP1* genetic testing.

• S088
DNA methylation patterns in Uveal Melanoma derived FFPE samples correlate with survival

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Purpose To examine correlation of DNA methylation patterns of Human Uveal Melanoma with survival.
Methods FFPE samples from 24 UM patients undergoing enucleation of the eye in the period 1976-1989 were included. Inclusion was based on histopathological data, data from the Norwegian Cancer Registry and the Norwegian Cause of Death Registry. DNA was isolated from the FFPE samples and further bisulphite converted and restored according to Illuminas recommendations. Bisulphite converted DNA was then run on The Infinium HumanMethylation450 BeadChip assay (HM-450K). Bioinformatics analyses were conducted in R statistical software, including analysis of copy number variation.
Results Our data shows subclustering correlated with survival and mortality, additionally our data informs on epigenetically deregulated genes with the potential of increasing our knowledge about the underlying mechanisms of UM.
Conclusions The methylation profile of a given cancer can elucidate therapeutic targets, reveal biomarkers for early detection or identify high risk tumours. The present study is the first to report methylation changes in FFPE samples derived from UMs.

• S089
Electroporation enhances chemosensitivity of uveal melanoma cells

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Purpose Electrochemotherapy (ECT) is increasingly being used for tumour ablation with reduced systemic toxicity, in cancers refractory to current treatments. Metastatic UM is characterised by its innate chemoresistance to many widely used cytotoxic drugs; however, there are no reports of the use of ECT in this disease. We investigated the cytotoxic effect of bleomycin in combination with electroporation on three human uveal melanoma (UM) cell lines ***in vitro***.
Methods Mel270, 92-1 and OMM-1 UM cell lines were treated with either: a) electroporation alone (pulse amplitude 300-750 V/cm, 8-10 pulses, 100 µs, 5 Hz); b) bleomycin alone (0-10 µg/ml) or; c) in combination. Cell survival was analyzed by MTT viability assay after 36 hours.
Results Electroporation alone reduced cell viability in all UM cell lines with increasing pulse amplitude as compared with untreated control cells; maximum reduction in viability across all UM cell lines was 27% at 750V/cm for 10 pulses. All UM cell lines were resistant to the cytotoxic effects of bleomycin (0-10 µg/ml) alone. ECT of the UM cell lines with 750V/cm, 8 pulses, 100 µs, 5 Hz and bleomycin showed a dose-dependent reduction in cell viability; 1µg/ml bleomycin reduced viability by 57%, 46% and 51% in the Mel270, 92-1 and OMM-1 UM cell lines, respectively.
Conclusions *In vitro* ECT with bleomycin was more effective than the highest concentration of the antineoplastic drug or electroporation alone, opening new perspectives in the treatment of UM.

• S090
Uveal melanoma clonogenic response to proton beam irradiation

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Purpose The goal of this study was to compare the cellular clonogenic response to proton beam and X-ray irradiation of uveal melanoma cell line Mel270 and human melanoma cell line BLM.
Methods BLM line was derived from a skin melanoma metastasis to the lung, and Mel270 is a primary uveal melanoma cell line. Cells were irradiated with 1-5 Gy of X ray (300 kVp Phillips, 1Gy/min) or proton beam (60 MeV) from Proteus C-235. After irradiation cells were seeded for the clonogenic assay. Two weeks after seeding the number and type of clones were determined. Three types of clones were found: the largest in size holoclones (with the highest potential to proliferate), medium sized meroclones and the smallest paraclones (low potential to proliferate).
Results The total number of clones were similar for both cell lines and both types of irradiation. The RBE values calculated for 37% of survival fraction were 1.11 and 1.13 for Mel270 and BLM cells, respectively. Three types of clones seen in untreated cultures imply the heterogeneity of cellular populations. After irradiation the proportion between the three types of clones was changed: the number of holoclones was drastically lower, and the number of paraclones increased. The number of paraclones was lower after proton bean irradiation in comparison to X-rays in both cell lines.
Conclusions Proton beam and X-ray irradiation differently modify the proliferation potential of melanoma cells.

• S091

Histomorphological changes of uveal melanoma (UM) following proton beam therapy (PBR)

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Purpose PBR is used for the treatment of UM. Little is known about histomorphological alterations in UM following PBR. Our aim was to document these changes.
Methods Data was obtained for 25 UM enucleation samples following PBR between Jan 2005-Dec 2015. Histological sections were examined for morphological changes affecting tumour cells, its microenvironment and adjacent sclera. Data was analysed using SPSS Software.
Results 730 patients underwent enucleation at the Liverpool Ocular Oncology Centre (646 primary, 84 secondary); 41 underwent enucleation following PBR, of which 25 samples were analysed. Histological examination of tumour type classified 5 UM as epitheloid, 9 spindle, and 11 as mixed. Focal necrosis was seen in 10 cases (41.7%); bizarre mitoses in 5 (20.8%); tumour cell- ballooning in 17 (70.8%) and mummification in 12 (50%); and vessel wall- thickening in 13 (54.2%) and hyalinization in 15 (62.5%). Prominent tumour infiltrating lymphocytes (TIL's) were noted in 17 UM (70.9%), and tumour-associated-macrophages (TAM's) in 15 (62.5%); 19 UM (79.2%) had noticeable degenerative scleral changes. Median time elapsed between PBR and enucleation was 14.5 months (range 7-26). Bivariate analyses demonstrated statistically significant correlations between interval from PBR to enucleation and histological changes (bizarre mitoses (p=0.035); tumour cell mummification (p=0.025), nuclear inclusions (p=0.002); TILs/TAMs (p=0.022); plasma cells (p=0.021); and hyalinisation (p=0.031). UMs enucleated >20 months following PBR were 1.73 times more likely to have inflammation and bizarre mitoses than eyes enucleated within 10 months following PBR (p=0.041).
Conclusions The histopathological alterations of UM following PBR are complex, and evolve over time, with increasing degenerative and inflammatory changes. Immunohistochemical and genetic studies are underway.

• S092

UM Cure 2020 - A consortium of European experts in uveal melanoma to identify new therapies for patients with metastatic disease

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Purpose Uveal melanoma (UM) is a rare intraocular tumour with an incidence of 5 cases per million individuals per year. Up to 30% of UM patients develop metastases, most often in the liver, and there is no therapy to either prevent or treat these metastases. Despite new discoveries in the genetic and molecular background of the primary tumour, little is known about the metastatic disease.
In UM Cure 2020, funded by European Union's Horizon 2020 programme, we will identify and validate at the preclinical level novel therapeutic approaches for the treatment of UM metastases (www.umcure2020.org). The Consortium brings together major EU experts in clinical, translational and basic research on UM, as well as patient representatives and innovative biotech companies.
Methods An ambitious multidisciplinary approach is proposed to move from patient tissue characterisation to preclinical evaluation of single or combinations of drugs. We will characterise the genetic landscape of metastatic UM and its microenvironment, perform proteomic studies to address signalling pathway deregulation and establish novel relevant in vitro and in vivo UM models. Underpinning this will be our virtual sample registry, linking existing biobanks into a harmonised network, which will prospectively collect primary and metastatic UM samples.
Results In parallel, we are already evaluating in the first phase of the project the efficacy of a series of active compounds using partners' available models. In addition to the initiation of UM-dedicated clinical trials, dissemination of results includes initiatives to increase patient information and disease awareness, in particular by supporting the formation of a European UM patient network.
Conclusions The UM Cure 2020 Consortium holds great potential to make significant advances in the treatment of metastatic UM, at present an incurable disease.

• S093

Choroidal nevi classification using swept source optical coherence tomography and infrared reflectance patterns at different wavelengths

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Purpose Retrospective observational study attempting a classification of choroidal nevi according to the different reflectivity patterns on SS-OCT and examining the differences on infrared imaging at two wavelengths(830 and 1050nm) among categories
Methods OCT and infrared images were obtained on 110 clinically diagnosed choroidal nevi from 108 different patients with two different devices: Spectralis SD-OCT(Heidelberg) at 830 nm and Atlantis DRI SS-OCT(Topcon) at 1050 nm. Based on the reflectivity pattern displayed on SS-OCT, the lesions were classified by a single grader into: Type A (high reflectivity with optical shadowing), type B (medium reflectivity with partial visualization of scleral boundary) and type C (homogeneous hyporeflectivity with visualization of scleral boundary). Infrared images of the lesions at 830nm(NIR) and 1050 nm(IR-SS) were classified into hyper, iso or hyporeflective.
Results 110 choroidal nevi were classified as follows: 51 (46.4%) as type A, 19(17.3%) as type B and 30(27.3%) as type C. 10 lesions (9%) did not fall into either category. In type A, 48 lesions (94%) displayed low reflectance on IR-SS, but hypereflectivity on NIR. In type B 13(68%) were hypereflective on NIR and iso or hyporeflective on IR-SS. In type C 28 lesions (93%) were iso or highly reflective on IR-SS and also iso or highly reflective on NIR.
Conclusions SS-OCT allows visualization of the choroidal anatomy and characterization of choroidal nevi into three distinct patterns according to the reflectivity displayed. The reflectance pattern on infrared image was drastically different between the two different wavelengths across the OCT patterns. Type A and B showed opposite reflectance patterns between the two devices, while type C displayed similar hypereflectivity.

• S094

Wide-field autofluorescence and scanning laser ophthalmoscopy: a tool for differential diagnosis of intraocular tumors

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Purpose Fundus autofluorescence is a non invasive technique for evaluation of intrinsic autofluorescence of the tissues within the eye; it is an important diagnostic tool for the assessment of various ocular diseases and also for the differential diagnosis of intraocular tumors.The fundus autofluorescence represents the status of the overlying retinal pigment epithelium (RPE) and the natural activity of the complex RPE- photoreceptors.
Methods We have examined 60 eyes of 60 patients: 40 nevi,12 melanomas, 6 angiomas, 2 choroidal metastasis from lung cancer. All patients carried out a complete eye examination, an OCT (optical coherence tomography), an autofluorescence using a green wavelenght (532 nm) and a blu wavelenght (488), and a fluorangiography. The number of follow-up was based on the pathology analyzed.
Results The autofluorescence is predictable of the nature of the tumor. Whereas the diagnosis of small coroidal melanomas remains controversial,imaging such as OCT and fundus autofluorescence are useful to detect subretinal fluid and lipofuscine. It is an additional useful tool together with OCT, fundus photography, ultrasonography and fluorangiography in making differential diagnosis.
Conclusions Studying the different characteristics of intraocular tumors at autofluorescence we can have important indications about the nature of the tumor. Some findings are strongly characteristics of certain tumors: a choroidal nevus appears silent at autofluorescence,while melanomas show an area of hypo-autofluorescence; the gravitation tract is typical of angiomas and metastasis appear as a patchy pattern of hyper-autofluorescence and hypo-autofluorescence.

• S095

Transpalpebral near-infrared LED transillumination for anteriorly located intraocular tumors imaging

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Purpose To study the possibilities of transpalpebral near-infrared LED transillumination for intraocular tumors imaging.
Methods This study was conducted on 35 people (35 eyes) with intraocular tumors of the ciliary body and iris. In all cases a color photo of the anterior eye segment, transpalpebral near-infrared LED transillumination, ultrasound examination were made.
The device for transillumination consists of compact wireless near-infrared LED-probe, monochrome camera able to capture video and images in the near-infrared range, slit lamp adaptor and a computer with software. For transpalpebral transillumination were used near-infrared light sources with a wavelength of 940 nm. Examination was performed without local anesthesia.
Results In all cases structures of the ciliary body were registered by transpalpebral near-infrared LED transillumination. Monochrome images of the ciliary body structures of good diagnostic quality were captured during the infrared transillumination of the eye in all cases.
In patients with intraocular tumors transpalpebral near-infrared transillumination made it possible to visualize ciliary body structures and tumor shadows on sclera and to outline their borders. In all cases anteriorly located intraocular tumor shadow was detected and tumor localization in relation to the ciliary body structures was estimated.
Conclusions Transpalpebral near-infrared LED transillumination provides imaging of the ciliary body and accurately estimates the projection of its structures to the sclera. Transpalpebral near-infrared transillumination helps to visualize intraocular tumors and to determine their projection to the sclera and can be used for diagnostic purposes and during destruction of the tumor.

• S096

The role of anterior segment optical coherence tomography (AS-OCT) and ultrasound biomicroscopy (UBM) in conjunctival nevi

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Purpose To compare AS-OCT and UBM in the evaluation of conjunctival nevi.
Methods Prospective, observational, non-randomized trial. We examined 16 eyes of 15 consecutive patients with conjunctival nevi.
Results The visualization of the margins of the nevus was categorized as good, fair or poor. There was a good resolution in 100% of anterior margins for both UBM and AS-OCT cases. On UBM and AS-OCT the posterior margin had a good or fair resolution in 94% and 88%, respectively. Except for 1 UBM image, all AS-OCT and UBM images had a good or fair resolution of the lateral margins. Some degree of deep optical shadowing was seen on all AS-OCT images, but it only hindered good visualization of the posterior margin in 3 cases.
AS-OCT was able to visualize the nevi with a better resolution than UBM. Intrinsic cysts were seen in 6 cases (36%) with UBM and in 13 cases (81%) with AS-OCT, not necessarily in the same cases.
Conclusions AS-OCT and UBM have the ability to accurately visualize the anterior and posterior margins of conjunctival nevi although AS-OCT is more accurate in visualizing details. AS-OCT is also more patient friendly but it has the disadvantage of deep optical shadowing, especially in thick nevi. We would advise to document conjunctival nevi with photographs and AS-OCT first and to use UBM only when the nevus is too thick to visualize the posterior margin with AS-OCT.

• S097

Clinical and morphometric investigation of retinopathy in children with retinoblastoma treated with chemotherapy

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Purpose To analyze the results of clinical and morphometric investigation of retina in children with retinoblastoma treated with systemic and local chemotherapy in comparison with children with primary untreated tumor.
Methods 55 children (87 eyes) with retinoblastoma treated with systemic chemotherapy, intra-arterial, intravitreal chemotherapy and 19 patients (38 eyes) with primary tumors before treatment were examined. All patients were examined by ophthalmoscopy using Ret Cam and spectral optical coherence tomography.
Results After systemic chemotherapy fundus examination revealed retinal edema, retinal artery narrowing, focal and / or diffuse choroidal blanching, pigmented foci of small and medium sizes. On tomograms - hyperreflective loop luminal narrowing, a significant decrease in the caliber of retinal blood vessels as compared to the norm of 16 ± 4,1 microns; waviness photoreceptor layer and its destruction; . In macula - 42.6% on tomograms - maculopathy, manifested disorganization RPE, cystoid edema, smoothness papillomacular beam forming beak shaped fovea and retinal thickening. In patients treated with primary systemic and intra-arterial chemotherapy diagnosed increase in retinal vascular caliber up to 116 ± 8,1 microns. The clinical picture after systemic chemotherapy and intavitreal chemotherapy in 14 eyes characterized by atrophy with the formation of small whitish and pigmented lesions. On tomogramms-unevenness and destruction of the inner layers of the retina and epiretinal membranes little-pointedhyperreflective tricks in the inner layers of the retina.
Conclusions The results of clinical and morphometric studies of the inner shells eyes, arising under the influence of chemotherapeutic agents are of interest in terms of predicting the visual functions of the child after the complete destruction of the tumor.

• S098

Congenital malignant ciliary body medullepithelioma in two newborns

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Purpose Intraocular medulloepithelioma is an extremely rare unilateral intraocular tumor arising from the nonpigmented ciliary epithelium. Medulloepitheliomas may be classified as benign and malignant and as teratoid and nonteratoid tumors.
Ciliary body medulloepithelioma is usually manifesting in early childhood, rarely at birth.
Differential diagnosis includes in particular unilateral retinoblastoma. Intraocular medulloepithelioma may also occur as masquerade-syndrome simulating uveitis.
Methods We report two new
cases of intraocular malignant ciliary
body medulloepithelioma in newborns presenting as leucokoria and buphthalmos at birth..
Results Both infants were enucleated and diagnosis was confirmed by histopathology.
Conclusions Medulloepithelioma is a rare childhood tumor and should be considered in the differential diagnosis of an intraocular mass in a child.
Imaging plays a limited role in differentiating the mass from other solid and cystic ciliary body masses but it is valuable in determining tumor extension and recurrences.
Advanced medulloepithelioma at birth with buphthalmos can simulate retinoblastoma and easily be misdiagnosed.

• S099

Proton beam radiotherapy (PBR) for the treatment of retinal capillary haemangioblastoma

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Purpose We describe the treatment of retinal haemangioblastomas with proton beam radiotherapy as a primary treatment for juxtapapillary lesions, and as a secondary treatment in refractory cases.
Methods Retrospective analysis of patients from Jan 1997-Dec 2011 with retinal haemangioblastomas treated in the Clatterbridge Cancer Centre Douglas Cyclotron. Patients were treated with reduced dose 18Gy.
Results Seven patients were treated, 4 with Von Hippel Lindau syndrome.
Five cases had juxtapapillary lesions; 5 had previous failed therapy; argon laser photocoagulation-3, photodynamic therapy-3, intravitreal anti-VEGF (bevacizumab/abflibercept)-4, ruthenium-106 plaque brachytherapy-2, vitrectomy with endolaser-1. Tumour diameter was 4.0-7.2mm (mean 4.8mm) and thickness 1.2-4.2mm (mean 2.2mm) with visual acuity logMAR 0.0-hand movements (mean 0.9). Mean follow up was 24months (12-48m). Within three months, all lesions regressed which continued over 18 months; tumour diameter decreased by 2.7mm (1.5mm depth). All cases demonstrated resolution of subretinal fluid within 3-6months; however 3 developed radiation maculopathy at 12-22months and were treated with intravitreal bevacizumab with good effect. Five patients had visual stabilisation; one case had visual improvement and another lost vision (HM to PL) (mean 0.8) due to radiation maculopathy.
Conclusions PBR is an effective treatment for retinal haemangioblastomas with good regression of tumours; side effects are fewer and less severe than that reported with external beam radiotherapy, however our rates of radiation maculopathy were >40% despite a dose of 18Gy. Although the expense and difficulty with access may limit its use, PBR ought to be considered in refractory cases unresponsive to alternative therapies, and in juxtapapillary lesions where alternative treatments cause rapid and severe visual loss.

• S100

Management strategies in vasoactive proliferative tumor of the retina

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Purpose Vasoactive proliferative tumor of the retina is extremely rare in children. Our purpose is to report the clical characteristics and management stratregy in this rare tumor of the retina.
Methods Case Report
Results A 12 years-old female was presented with decreased vision on her left eye. The vision was 20/20 on OD and counting fingers at 1 meter on OS. There was marked retinal edema and exudation at presentation. Full systemic evaluation was performed without any evidence of systemic disease. There was also no other ocular disease. On fundus examination there was telenigectatic vessels adjasent to peripapillary retina. Previous attempts of intravitreal antiVEGF bevacizumab injections elsewhere did not improve the vision and macular edema. The patient had marked retinal fluid at presentation and we decided to try intravitreal dexamethasone implant (Ozurdex) in treatment. The vision improved significantly right after the treatment but the patient developed cataract after two Ozurdex applications. After phacoemulsification with IOL implantation we were able to apply laser photocoagulation as the retinal fluid is resolved significantly and the vision improved to 20/40 after three Ozurdex applications.
Conclusions Vasoactive proliferative tumor is extremely rare in children. Our case indicates that intravitreal dexamethasone implant (Ozurdex) is effective in resolution of subretinal fluid in such cases and this treatment modality gives a window to apply destructive laser over the lesion to prevent recurrences of macular edema.

• S101

Intravitreal bevacizumab as an adjuvant treatment of choroidal metastasis

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Purpose Metastatic tumours are the most common intraocular malignancy. Although rare, lung and breast cancers are two of the predominant tumours to metastasize to the eye. The choroid, an highly vascularised structure, is the intraocular site most commonly affected. Recent case reports point intravitreal bevacizumab as an option in the treatment of these tumours. The authors present a case of choroidal metastasis secondary to breast carcinoma treated with intravitreal bevacizumab.
Methods A patient with choroidal metastasis was treated with intravitreal bevacizumab. Clinical and tumour response was observed and documented for a period of 24 months.
Results A 55-year-old female patient, with an history of localized breast carcinoma treated nine years previously, presented with decreased visual acuity in the right eye. She had a best corrected visual acuity (BCVA) of counting fingers at 10 centimetres. Examination revealed a choroidal metastatis in the temporal region of the posterior pole as well as serous macular detachment. The off-label treatment with intravitreal bevacizumab was proposed and the patient underwent three consecutive (one month interval) intravitreal injections, as an adjuvant to the chemotherapy with paclitaxel. With just one IVB, the patient reported an improvement of her visual acuity and one month after the third IVB she had a BCVA of 6/10. At this time, significant tumour and subretinal fluid regression was confirmed by fundus examination and optical coherence tomography. Until the present time (two years follow-up). the patient remained clinically stable with no need of further IVB. There were no ocular or systemic complications with the treatment instituted.
Conclusions The combination of intravitreal bevacizumab and systemic chemotherapy seems to be effective and safe for management of choroidal metastasis from breast carcinoma.

• S102

Primary intraocular lymphoma and flow cytometry analysis of the vitreous – a case report

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Purpose To present a case of chronic bilateral uveitis which preceded diagnosis of B-cell intraocular lymphoma based on the results of a vitreous flow cytometry analysis.
Methods We conducted a retrospective and interventional case report.
Results A 46-year-old woman was admitted to the Department of Ophthalmology of Jagiellonian University in Krakow witha 6-months history of deterioration of vision in both eyes. Clinical examination showed the presence of bilateral chronic uveitis with the presence of subretinal multiple yellow lesions. The standard screening panel laboratory tests for uveitis showed no pathology. MRI of a central nervous system was within normal limits. Because of no improvement in BCVA andthe presence of active intraocular inflammation inspite of long-term systemic steroids and immunosuppressant therapy a diagnostic 25G ***pars plana***vitrectomy was performed. A 1.5 cc of non-diluted vitreous was taken and analyzed using a flow-cytometry. The cytometric analysis of the vitreous aspirate showed the presence of 67,5% of lymphocyte B population (CD3+; CD2+, CD5+; CD7+, CD45RO+; CD38+, HLADR+/-; CD45RA-) with CD4/CD8=8.5. The diagnosis of B-cell lymphoma was established.
Conclusions Flow cytometry analysis of vitreous aspirate may be a precious diagnostic tool in unclear clinical cases of intraocular inflammation, in eyes suspected for intraocular neoplastic process.

• S103

Sequential bilateral optic nerve infiltration as the sole manifestation of relapsed T-cell lymphoblastic lymphoma: a case report.

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Purpose Central nervous system(CNS)involvement in non-Hodgkin lymphoma (NHL)is well-known,occurring in approximately 10% of all cases.Among these, infiltrative lymphomatous optic neuropathy (LON) affects 5% usually in the setting of active CNS disease. However, isolated LON in relapsed NHL remains exceptionally rare. Herein, we present a unique case of sequential bilateral optic nerve infiltration as the sole manifestation of relapsed T-cell lymphoblastic lymphoma.
Methods case report
Results A 30-year-old male patient diagnosed as a case of mediastinal T-cell lymphoblastic lymphoma (LBL).Staging CT confirmed no other site was involved. He received chemotherapy as per protocol.Re-evaluation with chest CT showed complete resolution of the mass. Five weeks later,the patient presented to private hospital complaining of right eye pain with blurred vision and by the fifth day his vision deteriorated to no light perception.He was diagnosed as relapsed LBL with isolated right optic nerve infiltration and treated accordingly.Two months later,he presented to our center for the first time with left eye pain and blurred vision.Full eye examination revealed blind right eye with no perception of light. Retinal examination for right eye was consistent with combined retinal artery and vein occlusion. Left eye fundus examination revealed gross swelling of the optic disc.Brain MRI showed swollen left optic nerve with no mass occupying lesion.He was treated promptly with radiotherapy and planed for re-induction chemotherapy.
Conclusions Optic nerve infiltration represents an ocular emergency where timely diagnosis and intervention can prevent the irreversible loss of vision. Ophthalmologists should keep high index of suspicion and consider prompt through eye examinations along with brain imaging in patients with history of lymphoma presenting with visual complaints.

• S104

Clinical and instrumental diagnostics in patients with orbital metastasis

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Purpose To analyze the data of clinical and instrumental features of patients with metastatic lesions of the orbit.
Methods 26 patients (21 women and 5 men) with orbital metastasis aged from 42 to 84 years (mean - 57,3 ±11,2) were examined and treated in our department in the period from 2009 to 2014. All patients underwent a complete clinical and instrumental examination including CT (MRI) and ultrasound. Metastatic orbital lesions were confirmed morphologically (23 patients) and cytologically (3 patients).
Results A unilateral lesion of the orbit was found in 21 patients, bilateral - in 5 patients. 19 patients had a history of cancer before orbital symptoms appeared, in 3 patients - orbital symptoms preceded the identification of the primary tumor, in one patient - simultaneously with the primary focus (uveal melanoma with extraocular growth and metastasis to the contralateral orbit). According to CT and US data in 23 patients there were detected diffuse tissue with extraocular muscles involvement. The lesions mostly localized in the central and lower parts of the orbit (17 patients), rare - in the upper and outer (9 patients). Destructive changes in the orbital walls (by CT) revealed only in 4 patients. According to histogenesis the epithelial metastatic tumors were prevailed: breast cancer - in 13, gastric cancer - 3, kidney cancer - 2, thyroid cancer - 2, cancer of the uterus - 1; bowel leiomyosarcoma - in 1, uveal melanoma – in 1 patient. In 3 patients (11.5%) with morphologically confirmed metastatic cancer of the orbit the nature of the primary lesion was not identified.
Conclusions Breast cancer is most common in development of metastatic tumors. Medical history data, clinical and instrumental findings are informative to suggest malignancy in orbit, requiring the need for morphological verification of the diagnosis for adequate therapy.

• S105

An analysis of IgG4-related ocular disease among idiopathic orbital inflammations and mucosa- associated lymphoid tissue lymphoma

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Purpose To determine the proportion of idiopathic orbital inflammation(IOI) and mucosa-associated lymphoid tissue(MALT) lymphoma accounted for by immunoglobulin(Ig)G4-related orbital disease(ROD) using domprehensive criteria and To report the clinicopathological characteristics of patients with ocular MALT lymphoma with IgG4-positive ells.
Methods A retrospective histopathological review and clinical case series. 49 patients from January 2005 through August 2015 were included. 20 cases of biopsy-confirmed IOI, 29 cases of biopsy-confirmed MALT lymphoma. Immunohistochemistry with IgG and IgG4 immunostaing. MALT lymphoma with IgG4 positive plasma cells were included when the IgG4/IgG ratio was 40% and IgG4 count was over 10/HPF. Histopathologic features, demographic and clinical data, radiologic findings, treatment and follow-up information for each patient were analysed.
Results Possible IgG4-ROD accounted for 50.0% of cases originally diagnosed as IOI and 41.38% of cases originally diagnosed as MALT lymphoma. IgG4 positive MALT lymphoma group has contralateral IgG4 positive chronic inflammation lesion(p=0.007). Relapse rate is higher than IgG4- unrelated group(p=0.05) but not significantly.
Conclusions Of the MALT lymphoma cases, 12 cases were diagnosed as having possible IgG4-ROD. Our result have demonstrated that ocular IgG4-ROD can predispose to the development of ocular adnexal MALT lymphoma. However, further longitudinal observations during the course of disease are needed to confirm whether B-cell lymphoma originate from IgG4-ROD.

• S106

Orbital mucocele: Orbital Masquarading Syndrome

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Purpose To discuss the clinical features and management in orbital mucucele.
Methods Six patients who were presented with progressive proptosis and orbital mass were included in our analysis. One patient had a history of gastric cancer, one patient had a history of previous trauma. All patients underwent surgery and excisional biopsies for differential diagnosis. The pathological diagnosis was consistent with mucocele in all cases. Three patients were controlled well with the initial surgical procedure, whereas 3 patients needed additional surgeries with sinus drainage.
Results All patients had inferior proptosis, as the tumor was involving superior and medial orbit. CT imaging demonstrated bone erosions in 4 cases. Surgically all cases represent cystic mass lesions without any solid component. Adding sinus drainage at the initial surgery may prevent recurrences in orbital mucocele.
Conclusions Orbital mucocele may masquarade lymphoid and cystoid orbital tumors, and all cases should be biopsied for differential diagnosis. In confirmed lesions drainage of the paranasal sinuses may prevent recurrences significantly.

• S107

First cases of ocular dirofilariasis caused by drofilaria repens in Belgium

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Purpose To report two different clinical ocular presentations of dirofilariasis caused by Dirofilaria repens and to illustrate the symptoms resulting from this rare condition.
Methods A case series of 2 patients.
Results The first patient was a 26 years old Romanian man complaining of one month-duration painless swelling and redness of the right eye. Slit lamp examination revealed a scleral nodule located nasally with conjonctival hyperhemia. This condition was diagnosed as nodular scleritis and was initially treated with systemic nonsteroidal anti-inflammatory medication and later, with systemic corticosteroids. Few weeks later, the patient came back to our clinic with the complaint of "something coming out of the eye". The examination of the right eye revealed a partial extrusion of a whitish living worm. Excisionnal biopsy was performed under general anesthesia with complete removal of the parasitic cyst wich was adherent to the medial rectus muscle.

The second case was a 61 years old man complaining about a slowly growing and slightly painful nodule located at the internal portion of the left superior eyelid that as been diagnosed as an inflammatory versus infectious anterior orbital cyst. A B-scan ultrasonography of the lesion documented an encapsulated cyst containing a living worm. The MRI confirmed the cystic component of this preseptal orbital and well-defined lesion with heterogenous signal. Through transcutaneous approach, excisionnal biopsy of the cyst was performed . The opened cyst showed a living parasite.
Conclusions Ocular Dirofilariasis is a rare condition that can easily be confused with tumoral and/or inflammatory lesion.

• S108

Grading iris color of post-mortem human eyes

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Purpose Iris colour encompasses a continuum from pale blue to very dark brown and is usually classified via a descriptive three colour scale: blue, green-hazel or brown. Digital imaging technologies provide an opportunity to quantify iris colour, and are increasingly used for studies of genetic variations in iris colour. We explored the use of digital imaging and colour space information for grading of iris colour in ***post-mortem*** eyes, including eyes with choroidal naevi.
Methods Post-mortem adult human irises (n=25) were examined and photographed using a Jenoptik digital camera and ProgResCaptureProv2.8.9 software. Standard lighting (colour temperature) and parameters for imaging were established and used for all specimens. Iris colour was graded (n=5) (using a nine-category system; Mackey et al. Clin Exp Ophthalmol, 2011). We also developed a method in Photoshop to express iris colour as Hue in the Hue, Saturation, Brightness (HSB) colour space, for comparison with the category grading.
Results Using the nine-category grading end-point grades (light blue and dark brown) were consistently graded. Intermediate grades were categorised differently for some observers, usually with adjacent categories. Green irises were not observed in this small series. Digital imaging using standard iris images and an averaging filter, provided colour information (Hue) for each iris. This allowed discrimination of iris colour compared to category grading.
Conclusions As expected category-grading was not always consistent between observers. We developed a digital imaging approach using HSB color space to give a H value for each iris. We are exploring the utility of processing functions such as gaussian blur. This approach provides a standard iris colour for ***post-mortem*** tissue and will be used for comparison with fundus colour..

• S109

Histopathological findings after pars plana vitrectomy with a new hypersonic vitrector

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Purpose Assess morphological changes in the retina and optic nerve head (ONH) after pars plana vitrectomy with a new prototype ultrasound-based hypersonic vitrector (HV).
Methods Six porcine cadaveric eyes, 6 human cadaveric eyes and 14 live porcine eyes underwent pars plana vitrectomy (PPV) using the HV or a pneumatic guillotine vitrector (GV). One extra eye from each porcine group had no procedure done, being used as a control. Eyes were fixed in formalin, examined macroscopically and processed for histological assessment. Microscopic analysis included assessment of any morphological intraocular change especially to the retina and ONH. Comparison was made between non-vitrectomized (intenal control) and vitrectomized areas, respectively nasal and temporal to ONH .
Results There were no macroscopic retinal or ONH defects associated with either HV or GV PPVs. Microscopically, cadaveric human and porcine retinas showed focal vacuolization and fragmentation at the nerve fibre layer and the ganglion cell layer as well as separation of the inner limiting membrane (ILM). Eyes from live swines following PPV with both vitrectors showed ILM fragmentation and separation. There were no differences between the "non-vitrectomized" nasal (control) and vitrectomized temporal areas of the ONH with HV.
Conclusions Morphological examination of retina and ONH with light microscopy after PPV showed similar features using the HV or the GV. The HV might be a promising new alternative to the currently commercially available GV for PPV.

Conflict of interest
Any research or educational support conditional or unconditional provided to you or your department in the past or present?:
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• S110

Application of laser radiation exposed Chlorpromazine for the treatment of pseudotumours induced in rabbit eyes

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Purpose Multiple drug resistance (MDR) is a challenge that requires a flexible approach to find medicines able to overcome it. Among the methods used to overcome it, there is the exposure of existing medicines to UV laser beams to generate active photoproducts against bacteria and/or malignant tumors.
Methods We studied the interaction of UV activate Chlorpromazine (CPZ) (irradiated with 266 nm pulsed laser beams), at concentrations of 10 mg/ml and 20 mg/ml in ultrapure water, with rabbit eyes pseudotumors
Results The use of CPZ water solution exposed to 266 nm in the treatment of pseudotumor tissues produced on rabbit eyes shows that treatment results depend on initial (before irradiation) CPZ concentration and exposure time. At this stage, one may not specify which out of the generated photoproducts, individual or as a group, is/are efficient in pseudotumor cure but overall effects are observable. Application of CPZ irradiated solutions on rabbit eyes pseudotumors seems to produce a faster recovery of tissues with respect to control, untreated eyes.
Conclusions Histologic findings in the treated tissues show a good antiinflamatory response. The results obtained open perspectives to fight MDR and/or development of pseudotumoral processes with substances that were not initially made for this purpose (non-antibiotics, for instance).

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