



**MACULART**meeting  
PARIS - 2019

23 - 25 JUNE 2019 PARIS, FRANCE

[www.maculart-meeting.com](http://www.maculart-meeting.com)

ABSTRACT E-BOOK



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## WELCOME LETTER

Dear Colleagues and Friends,

MaculArt is an international meeting dedicated to the wonderful state of the art in field of macula. It is our great pleasure to announce the third International MaculArt Meeting, which will be held in the beautiful city of Paris, France on June 23-25, 2019. Due to the great success of the first and second editions, the committee decided to renew this wonderful experience and organize MaculArt 2019.

Top Ophthalmologists from around the globe will be present to share their knowledge and discuss major advances in our field. The scientific program of MaculArt 2019 will include clinical case sessions, poster sessions, free paper sessions, and 15 faculty sessions dedicated to exudative AMD, vein occlusion, diabetic maculopathy, artificial intelligence, myopic maculopathy, uveitis, and much more.

MaculArt 2019 will also give the opportunity to highlight innovations, hot topics and new imaging such as OCT angiography in addition to 3 lectures and 4 symposia given by experts. We are also pleased to host a panel of international experts, which will provide a forum for retina thought leaders to present data and engage in a lively discussion. A jury will nominate the best MaculArt image and the best poster Prize Award..

We welcome you to join us in our magical city and enjoy all that Paris has to offer, from haute cuisine, world-class entertainment, summer shopping sales, to breath-taking museums.

We will be honored by your presence.

A handwritten signature in black ink, appearing to read 'Eric Souied', with a stylized flourish at the end.

Eric SOUIED, Mayer SROUR and the FFM Organizing Committee



## COMMITTEE



Eric Souied  
President



Mayer Srour  
Scientific Program Coordinator



Alexander Brucker



Salomon Yves Cohen  
Clinical Cases



Catherine Creuzot Garcher  
Learned Societies & Experts  
Groups Relations



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Satellite Meetings Coordinator



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Artistic Features



David Sarraf



Johanna Seddon



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Giuseppe Querques  
Poster session



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Their Invaluable Contributions to the MaculArt Meeting 2019

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SCIENTIFIC PROGRAM

23 JUNE 2019, SUNDAY

Hours	Program
13:00-13:15	Opening Welcome Notes by Eric Souied and Mayer Srour
13:15-14:15	Free Retina Papers Rapid Fire: French Papers Session <i>Moderators: Salomon Yves Cohen-France, David Sarraf-USA, Sandrine Anne Zweifel-Switzerland</i>
13:15-13:20	Dimple in the serous pigment epithelial detachment secondary to neovascular age-related macular degeneration <i>Vittorio Capuano, University Paris Est Creteil, Centre Hospitalier Intercommunal de Creteil, France</i>
13:20-13:25	Color fundus imaging of fibrotic scars in exudative age related macular degeneration. A comparison between Multicolor vs Color Fundus Photography vs Optos <i>Irene De Rosa, University Paris Est Creteil, Centre Hospitalier Intercommunal de Creteil, France</i>
13:25-13:30	Subretinal Pigment Epithelium fibrotic tissue response to anti-Vascular Endothelial Growth Factors in Age-related Macular Degeneration <i>Dudy Semoun, University Paris Est Creteil, Centre Hospitalier Intercommunal de Creteil, France</i>
13:30-13:35	OCTA-guided navigated laser therapy for choroidal neovascular membranes secondary to age related macular degeneration <i>Francesca Amoroso, Intercity Hospital and Paris Est University, France</i>
13:35-13:40	Choroidal neovascular area and vessel density comparison between two swept-source optical coherence tomography angiography devices <i>Avi Ohayon, University Paris Est Creteil, Centre Hospitalier Intercommunal de Creteil, France</i>
13:40-13:45	Quantitative deep capillary plexus analysis in optical coherence tomography angiography: quiescent neovascularization versus intermediate and neovascular AMD <i>Donato Colantuono, University Paris Est Creteil, Centre Hospitalier Intercommunal de Creteil, France</i>
13:45-13:50	Follow up of macular neovascularization using octa: prn versus treat&extend <i>Pierre Sustronck, University Paris Est Creteil, Centre Hospitalier Intercommunal de Creteil, France</i>
13:50-13:55	Real-World Use of Intravitreal Aflibercept Injections in Diabetic Macular Edema: 1-Year Interim Results of APOLLON <i>Catherine Creuzot Garcher, CHU Dijon, Dijon, France</i>
13:55-14:00	Comparison of modules on a mobile medical app with standard tests for remote monitoring of visual parameters <i>Vincent Gualino, Clinique Honoré Cave, Montauban; CHU Purpan, Toulouse; CHU Lariboisière, France</i>
14:00-14:05	Setting up a nurse-led Optical Coherence Tomography (OCT) clinic: Structure and role of the clinic <i>Boo Hui Tan, NHS Borders, Borders General Hospital, United Kingdom</i>
14:05-14:10	Optical coherence tomography angiography extravascular signal in diabetic macular edema <i>Aude Couturier, Hôpital Lariboisière, AP-HP, Université Paris 7 – Sorbonne Paris Cité, France</i>
14:10-14:15	Impact of Intravitreal Aflibercept Dosing Regimens in Treatment-Naïve Patients with Neovascular Age-Related Macular Degeneration <i>Marie Noelle Delyfer, CHU Hôpitaux de Bordeaux, France</i>
14:14-15:03	Clinical Cases 1 <i>Moderators: Roland Theodore Smith-USA, Catherine Creuzot-Garcher-France, Adnan Tufail-United Kingdom</i>
14:15-14:21	OCTA Breaking News <i>Polina Astroz, Intercity Hospital and University Paris Est, France</i>
14:21-14:27	Watching the countryside <i>Eleonora Corbelli, University Vita-Salute, IRCCS Ospedale San Raffaele, Italy</i>
14:27-14:33	A matter of symmetry <i>Maria Vittoria Cicinelli, University Vita-Salute, IRCCS Ospedale San Raffaele, Italy</i>
14:33-14:39	Neovascularisation the choroid and CSCR <i>Kelvin Teo, Singapore National Eye Centre</i>
14:39-14:45	Bilateral pigmented paravenous chorioretinal atrophy <i>Pierre Henri Gabrielle, University Hospital, Dijon, France</i>
14:45-14:51	Anatomy versus function <i>Jennyfer Benillouche</i>
14:51-14:57	Mysterious cases <i>Wei Gui, UCLA Stein Eye Institute, USA</i>
14:57-15:03	Mysterious cases <i>Kirk Hou, UCLA Stein Eye Institute, USA</i>



SCIENTIFIC PROGRAM

23 JUNE 2019, SUNDAY

Hours	Program
15:03-15:51	<p>Clinical Cases 2 <i>Moderators: Marco Zarbin-USA, Sandrine Zweifel-Switzerland, Giovanni Staurenghi-Italy</i></p> <hr/> <p>15:03-15:09 In need of an electrophysiologist <i>Olivia Zambrowski, University Paris Est Créteil, France</i></p> <p>15:09-15:15 Bilateral retrohyaloid hemorrhage complicating leukemic retinopathy: a case report <i>Meriem Ouederni, Habib Thameur Hospital, Tunisia</i></p> <p>15:15-15:21 AMNR: differential diagnosis with PAMM. About a case in a young woman <i>Stephane Delage, France</i></p> <p>15:21-15:27 An unusual case of chorioretinitis in a young girl <i>Bilal Shehadeh, Ziv Medical Center, Israel</i></p> <p>15:27-15:33 Mysterious cases <i>Cameron Pole, UCLA Stein Eye Institute, USA</i></p> <p>15:33-15:39 Persistent Macular Edema in Diabetic Patient <i>Muhammad Abumanhal, Tel Aviv Medical Center, Israel</i></p> <p>15:39-15:45 Amyloid retinopathy <i>Vincent Daien, Guy de Chaulait Hospital, France</i></p> <p>15:45-15:51 Paraneoplastic syndrom <i>Sarah Tick, CHNO des Quinze-Vingts, France</i></p> <hr/>
15:51-16:45	<p>Clinical Cases 3 <i>Moderators: K. Bailey Freund-USA, Alexander Brucker-USA, William F. Mieler-USA</i></p> <p>15:51-15:57 Treatment Dilemma of Toxic Maculopathy <i>Ayala Pollack, Tel Aviv Medical Center, Israel</i></p> <p>15:57-16:03 Mystery Case <i>Sandrine Anne Zweifel, University Hospital Zurich, Switzerland</i></p> <p>16:03-16:09 Treating a Genetic Disorder with Intravitreal Corticosteroids <i>Richard Spaide, Vitreous Retina Macula Consultants of NY, USA</i></p> <p>16:09-16:15 A tense situation <i>Srinivas Sadda, Doheny Eye Institute/UCLA, USA</i></p> <p>16:15-16:21 Mystery Macula <i>William F. Mieler, University of Illinois at Chicago (UIC), USA</i></p> <p>16:21-16:27 Mystery case <i>K. Bailey Freund, Vitreous Retina Macula Consultants of New York, NYU School of Medicine, USA</i></p> <p>16:27-16:33 Mystery case <i>David Sarraf, Stein Eye Institute, UCLA, USA</i></p> <p>16:33-16:39 Mystery case <i>Eric Souied, Hôpital Intercommunal, Hopital Henri Mondor, Creteil/Universite Paris Est, France</i></p> <p>16:39-16:45 Preretinal Deposits <i>Caroline Bauman, Tufts University School of Medicine, USA</i></p> <hr/>
16:45-17:00	<p>Award Best Maculart Imaging <i>Best Imaging Jury: Eric Souied, David Sarraf, Sandrine Zweifel, Caroline Bauman, William F. Mieler, K. Bailey Freund, Srinivas Sadda, Mayer Srour</i></p> <hr/>
17:00-17:50	<p>Industry Sponsored Symposium</p> <hr/>
17:50-19:00	<p>Poster Session&amp;Andre Sierro Award for the Best Poster <i>Poster Jury: Quan Dong Nguyen-USA, Diana Do-USA, Richard Spaide-USA, Gemmy Cheung Chui Ming-Singapore, Paul Bernstein-USA, Alfredo Garcia Layana-Spain</i></p> <hr/>



## SCIENTIFIC PROGRAM

### 24 JUNE 2019, MONDAY

Hours	Program
07:45-07:50	Welcome Notes & Announcements
07:50-09:00	Innovations <i>Moderators: Michael Singer-USA, José Sahel-France, Quan Dong Nguyen-USA, Anat Loewenstein, Israel</i>
07:52-08:00	Risk factor for geographic atrophy in anti-VEGF treated patients <i>Giovanni Staurengi, Università degli Studi di Milano, Italy</i>
08:00-08:08	The eye in space: next step to Mars travel <i>Thibaud Mathis, Croix-Rousse University Hospital, France</i>
08:08-08:16	Pharmacological antagonism of mineralocorticoid receptor exerts VEGF-independent anti-angiogenic effects: Implication for wet AMD <i>Francine Behar Cohen, Paris Descartes University, Sorbonne Paris Cité, Centre de Recherche des Cordeliers, France</i>
08:16-08:24	Imaging of RPE cells using near-infrared autofluorescence adaptive optics SLO in healthy eyes and AMD <i>Michel Paques, Quinze-Vingts Hospital, France</i>
08:24-08:33	Understanding effects on retinal nerve fiber layer in patients treated with dexamethasone implants <i>Michael Singer, Medical Center Ophthalmology Associates, USA</i>
08:33-08:42	mTOR Inhibition for Non-Infectious Uveitis and Beyond: The Evolution of Intravitreal Sirolimus through Clinical Trials <i>Quan Dong Nguyen, Stanford University School of Medicine, USA</i>
08:42-08:51	Phase 1 First-In-Human Study of KSI-301: a Novel Anti-VEGF Antibody Biopolymer Conjugate with Extended Durability For Wet AMD, DME, and RVO <i>Diana Do, Stanford University School of Medicine, USA</i>
08:51-09:00	Photovoltaic restoration of central vision in Patients with GA <i>Jose Sahel, Université Pierre-et-Marie-Curie, France</i>
09:00-09:50	Macula Imaging 1 <i>Moderators: Srinivas Sadda-USA, David Sarraf-USA, Eric Souied, France</i>
09:00-09:08	Patterns of choroidal thickness in healthy choroid: where pachychoroid does start? <i>Alain Gaudric, Lariboisiere Hospital, France</i>
09:08-09:16	OCT characteristics of eyes with favorable long-term visual outcomes after anti-VEGF therapy <i>Srinivas Sadda, Doheny Eye Institute/UCLA, USA</i>
09:16-09:24	Choriocapillaris alterations as a biomarker for predicting progression of geographic atrophy <i>Srinivas Sadda, Doheny Eye Institute/UCLA, USA</i>
09:24-09:32	From MNV to Fibrotic scar <i>Eric Souied, Hôpital Intercommunal, Hôpital Henri Mondor, Creteil/Université Paris Est, France</i>
09:32-09:40	Home OCT <i>Anat Loewenstein, Tel Aviv Sourasky Medical Center, Israel</i>
09:40-09:48	Chorioretinal folds associated with central serous chorioretinopathy <i>Salomon Yves Cohen, CIL - Centre Ophtalmologique d'Imagerie et de Laser, France</i>
09:50-10:05	Lecture: Imaging the Neurovascular Unit <i>Richard Spaide, Vitreous Retina Macula Consultants of NY, USA</i>
10:05-10:35	COFFEE BREAK AND EXHIBITION VISIT
10:35-12:00	Artificial Intelligence XL Session <i>Moderators: Neil Bressler-USA, Pearse Keane-United Kingdom, Frank Holz-Germany</i>
10:37-10:45	What is needed to validate AI software before clinical deployment? <i>Adnan Tufail, NHS, United Kingdom</i>
10:45-10:53	Recent Applications of Deep Learning AI in Age-related Macular Degeneration <i>Neil Bressler, Wilmer Eye Institute, USA</i>
10:53-11:01	Artificial intelligence for structure-based function prediction in age-related macular degeneration <i>Frank Holz, University Hospital Bonn, Germany</i>
11:01-11:09	A Telemedicine Deep Learning Platform for AMD <i>Roland Theodore Smith, Mount Sinai School of Medicine, USA</i>
11:09-11:17	Artificial Intelligence in Ophthalmology - the Moorfields-DeepMind Collaboration <i>Pearse Keane, Moorfields Eye Hospital Nhs Foundation Trust, United Kingdom</i>





## SCIENTIFIC PROGRAM

### 24 JUNE 2019, MONDAY

Hours	Program
11:17-11:25	Prediction of individual disease conversion in early AMD using artificial intelligence <i>Philipp K Roberts, Medical University of Vienna, Austria</i>
11:25-11:33	Developing Human Based Intuitive Deep Machine Learning Algorithms for Analyzing Intermediate AMD OCT Images <i>Karl Csaky, Retina Foundation of the Southwest, USA</i>
11:33-11:41	FDA-authorized autonomous AI for diabetic retinopathy screening in clinical routine <i>Bianca S Gerendas, Medical University of Vienna, Austria</i>
11:41-11:49	RETINASK? MACULART! An Introduction to the (Human) Intelligence of Automated Diagnosis of Macular Disease <i>Samir Sayegh, The EYE Center, Champaign/Chicago, USA</i>
11:49-11:57	OphtAI – Telescreening Platform for Automatic Evaluation of Diabetic Retinopathy <i>Pascale Massin, Hopital Lariboisiere, APHP, Paris 7 University, France</i>
11:57-12:00	Andre Sierro Award for the Best Poster Best Poster Announcement: <i>Eric Souied and Mayer Srour</i>
12:00-12:50	Industry Sponsored Symposium
12:50-13:45	LUNCH TIME AND EXHIBITION VISIT
13:45-14:45	OCTA Session <i>Moderators: Amani Fawzi-USA, Nadia Waheed-USA, Alexandra Miere, France</i>
13:45-13:53	Evolution of subclinical polypoidal choroidal vasculopathy on OCTA <i>Gemmy Cheung Chui Ming, Yong Loo Lin School of Medicine, National University of Singapore, Singapore</i>
13:53-14:01	AMD: Value of 3D OCT Angiography in predicting treatment frequency in neovascular AMD <i>Amani Fawzi, Northwestern University Feinberg School of Medicine, USA</i>
14:01-14:09	Comparing OCTA Density Measurements of Eyes With and Without Radiation Retinopathy After I-125 Plaque Brachytherapy <i>William F. Mieler, University of Illinois at Chicago (UIC), USA</i>
14:09-14:17	Death and Destruction in the Choriocapillaris: OCTA in dry AMD <i>Nadia Waheed, Tufts University School of Medicine, USA</i>
14:17-14:25	Quantitative Optical Coherence Tomography Angiography biomarkers for neovascular age related macular degeneration treated using a treat-and-extend regimen <i>Florance Coscas, Centre Hospitalier Intercommunal de Creteil, University Paris-Est Creteil, France</i>
14:25-14:33	Detection of Retinal Arterial (micro-)Emboli after Transcatheter Aortic Valve Implantation using OCTA and Fluorescence Angiography <i>Sandrine Anne Zweifel, University Hospital Zurich, Switzerland</i>
14:33-14:41	Long-term quantitative analysis of choriocapillaris flow impairment in age-related macular degeneration by means of optical coherence tomography angiography <i>Alexandra Miere, Centre Hospitalier Intercommunal de Créteil, Paris XII University, France</i>
14:45-15:45	Diabetes 1 <i>Moderators: Francesco Bandello-Italy, Caroline Bauman-USA, Michael Elman-USA</i>
14:45-14:53	Morpho-functional analysis of the retina in type 1 diabetic patients without complications after 30 years of disease <i>Francesco Bandello, San Raffaele Scientific Institute, Italy</i>
14:53-15:01	OCTA features of IRMA and retinal neovascularization <i>Caroline Bauman, Tufts University School of Medicine, USA</i>
15:01-15:09	Factors Associated With Visual Acuity and Central Subfield Thickness Outcomes with Anti-VEGF Therapy for Diabetic Macular Edema: DRCR.net Protocol T - DME session <i>Susan Bressler, Johns Hopkins University School of Medicine and Hospital, USA</i>
15:09-15:17	The Correlation of Response to Treatment with anti-VEGF compounds between the First and Second Treated Eyes in Diabetic Macular Edema <i>Itay Chowers, Hadassah Medical Center, Israel</i>
15:17-15:25	Exploratory Analysis of Change in Visual Fields Over 5 Years Among Eyes with Proliferative Diabetic Retinopathy <i>Michael Elman, Elman Retina Group, P.A., USA</i>
15:25-15:33	OCT Central Subfield Thickness and Visual Acuity in DME: Correlation, or Lack Thereof <i>Neil Bressler, Wilmer Eye Institute, USA</i>



## SCIENTIFIC PROGRAM

### 24 JUNE 2019, MONDAY

Hours	Program
15:33-15:41	Visual acuity gain profiles and anatomical prognosis factors in patients with drug-naïve diabetic macular edema treated with dexamethasone implant: the NAVEDEX study <i>Mauricio Pinto, Croix-Rousse University Hospital, France</i>
15:45-16:00	COFFEE BREAK AND EXHIBITION VISIT
16:00-16:50	Industry Sponsored Symposium
16:50-18:10	Inherited Disorders and Gene Therapy (Sensgene Session) <i>Moderators: Helene Dollfus-France, Johanna Seddon-USA, Itay Chowers, Israel</i>
16:50-16:58	Genetic Therapies Beyond RPE65 <i>Bart Leroy, Ghent University Hospital</i>
16:58-17:06	Role of Genetic testing in retinal diseases <i>Elise Heon, Institute of Medical Science - University of Toronto</i>
17:06-17:14	New Insights into the Genetic Basis of Macular Telangiectasia Type 2 (MacTel) <i>Paul Bernstein, Mary Boesche Professor of Ophthalmology and Visual Sciences, USA</i>
17:14-17:22	Is The Choroid Driving CME in Retinitis Pigmentosa? <i>David Sarraf, Stein Eye Institute, UCLA, USA</i>
17:22-17:30	A Composite, Polygenic Prediction Model is Validated in an External Cohort for Macular Degeneration Progression and Predictors of Incident Advanced AMD and Visual Acuity Loss Identify High Risk Individuals <i>Johanna Seddon, University of Massachusetts Medical School, USA</i>
17:30-17:38	Retinal Gene Therapy for Batten's Disease <i>Jason Slakter, New York University School of Medicine, USA</i>
17:38-17:46	Phenotypic characteristics of rod-cone dystrophy associated with MYO7A mutations in a Large French Cohort <i>Isabelle Audo, Sorbonne Université, France</i>
17:46-17:54	Design of a randomized, placebo-controlled phase one trial to evaluate the safety, pharmacokinetics and pharmacodynamics of BIO201 developed for the treatment of intermediate AMD and Stargardt Disease <i>Serge Camelo, Biophytis, Sorbonne Université, France</i>
17:54-18:02	Luxturna, the first approved gene therapy for RPE65-related retinal dystrophy: first European experience <i>Saddek Mohand Said, Sorbonne Université, France</i>
18:02-18:10	Rare eye diseases, two examples of French & European expert networks, SENSGENE and ERN-EYE <i>Helene Dollfus, Sensgene, France</i>



## SCIENTIFIC PROGRAM

### 25 JUNE 2019, TUESDAY

Hours	Program
07:45-08:00	Welcome Notes & Announcements
08:00-09:00	Free Retina Papers-Rapid Fire <i>Moderators: Mark Gilles-Australia, Kyoko Ohno-Matsui-Japan, Pascale Massin-France</i>
08:00-08:05	Contribution of MRI for the etiological assessment of uveitis: about 402 patients <i>Nicolas Chirpaz, Hospices Civils de Lyon, Croix-Rousse Hospital, France</i>
08:05-08:10	Volume rendering of central macula flow using optical coherence tomography angiography: qualitative and quantitative characterization <i>Ana Catarina Dias, Instituto de Oftalmologia Dr. Gama Pinto, Portugal</i>
08:10-08:15	Real-life study in diabetic macular edema treated with dexamethasone implant: a long time follow up results <i>Theo Lereuil, Hopital de la Croix Rousse LYON; Hospices Civils de Lyon, France</i>
08:15-08:20	AI in the real world: What are the perspectives <i>Amir Sadeghipour, Medical University of Vienna, Austria</i>
08:20-08:25	Subretinal OCT-A hyper reflective signal in central serous chorioretinopathy: newvessels or not? <i>Martine Mauget Fajsse, Fondation Adolphe de Rothschild, France</i>
08:25-08:30	Optical coherence tomography angiography findings in patients with PCV secondary to chronic central serous chorioretinopathy <i>Enrico Peiretti, University of Cagliari, Italia</i>
08:30-08:35	Ten years Outcomes of Treatment of Neovascular Age-Related Macular Degeneration: results of FRB France registry <i>Benjamin Wolff, Maison Rouge Ophthalmologic Center, France</i>
08:35-08:40	Sub-retinal pigment epithelium-basal lamina hyperreflective crystalline deposits in non-neovascular age-related macular degeneration: multimodal imaging and prognostic implications <i>Serena Fragiotta, Vitreous Retina Macula Consultants of New York, USA</i>
08:40-08:45	Ten-year incidence and progression of diabetic retinopathy in type 1 and type 2 diabetes mellitus in France and its impact on screening strategy: the OPHDIAT study <i>Pascale Massin, Hopital Lariboisiere, APHP, Paris 7 University, France</i>
08:45-08:50	Ten-Year Treatment Outcomes of Neovascular Age-Related Macular Degeneration <i>Mark Gillies, The University of Sydney, Australia; Sydney Eye Hospital, Australia</i>
08:50-08:55	Visual and expanded anatomical outcomes for brolucizumab versus aflibercept in patients with neovascular AMD: 96-week data from HAWK and HARRIER <i>Benjamin Wolff, Maison Rouge Ophthalmologic Center, France</i>
09:00-09:56	AMD Treatments 1 <i>Moderators: Pravin Dugel-USA, Jordi Mones, Spain, Usha Chakravarthy-United Kingdom</i>
09:00-09:08	Long term outcomes in the IVAN trial <i>Usha Chakravarthy, Queen's University, United Kingdom</i>
09:08-09:16	Intravitreal injection : how to prevent infection ? <i>Catherine Creuzot Garcher, University Hospital of Dijon, France</i>
09:16-09:24	The potential of retinal rejuvenation therapy, 2RT, as an early intervention for AMD <i>John Marshall, University College London, United Kingdom</i>
09:24-09:32	Gene Therapy: The Next Revolution <i>Pravin Dugel, Retinal Consultants of Arizona, USA</i>
09:32-09:40	Can AMD Treat Itself? <i>K. Bailey Freund, Vitreous Retina Macula Consultants of New York, NYU School of Medicine, USA</i>
09:40-09:48	Outcomes of discontinuing VEGF inhibitors in neovascular AMD <i>Mark Gillies, The University of Sydney School of Medicine, Australia</i>
09:48-09:56	Phase I/IIa Clinical Trial of Human Embryonic Stem Cell (hESC)-Derived Retinal Pigmented Epithelium (RPE, OpRegen) Transplantation in Advanced Dry Form Age-Related Macular Degeneration (AMD): Interim Results <i>Jordi Mones, Institut de la Macula, Spain; Barcelona Macula Foundation, Spain</i>
09:56-10:45	AMD Treatments 2 <i>Moderators: Lawrence Singerman-USA, Jason Slakter-USA, Sam Razavi-France</i>
09:56-10:04	Brolucizumab for AMD: a reduction in the burden of treatment is likely <i>Lawrence Singerman, Retina Associates Of Cleveland. Inc., USA</i>
10:04-10:12	APL-2 Complement Therapy for Geographic Atrophy <i>Jason Slakter, New York University School of Medicine, USA</i>



## SCIENTIFIC PROGRAM

### 25 JUNE 2019, TUESDAY

Hours	Program
10:12-10:20	Brimonidine Safety and efficacy in patients with geographic atrophy secondary to AMD <i>Eric Souied, Hôpital Intercommunal, Hopital Henri Mondor, Creteil/Universite Paris Est, France</i>
10:20-10:28	Evaluation of Baseline Characteristics on Lesion Progression in a Large Phase 2 Clinical Trial for Geographic Atrophy (FILLY Study) <i>Jordi Monés, Insitut de la Màcula, Centro Médico Teknon, Spain</i>
10:28-10:36	Brolucizumab versus aflibercept for neovascular AMD: expanded fluid analyses from the HAWK and HARRIER studies <i>Hessam Razavi, Transparency Eye Clinic, France</i>
10:36-10:44	Outcomes of Suspending VEGF Inhibitors for Neovascular Age-Related Macular Degeneration when Lesions Have Been Inactive for 3 Months <i>Mark Gillies, The University of Sydney, Australia; Sydney Eye Hospital, Australia</i>
10:50-11:05	LECTURE Treating Blindness at the Nanoscale: Nanotechnologies as Treatments for Retinal Blindness <i>Marco Zarbin, New Jersey Medical School, USA</i>
11:05-11:25	COFFEE BREAK AND EXHIBITION VISIT
11:25-12:37	Macula Imaging 2 <i>Moderators: Richard Spaide-USA, Bruno Lumbroso-Italy, Giuseppe Querques- Italy</i>
11:25-11:33	Henley fiber layer hemorrhages <i>Caroline Baumal, Tufts University School of Medicine, USA</i>
11:33-11:41	What have we learned from quiescent CNV? Reflections on geographical atrophy <i>Alfredo Garcia Layana, The Spanish Vitreoretinal Society (SERV), Spain</i>
11:41-11:49	Hyperspectral Autofluorescence (AF) Imaging for Early Detection of Age-related Macular Degeneration (AMD) <i>Roland Theodore Smith, Mount Sinai School of Medicine, USA</i>
11:49-11:57	New Proposal for the Pathophysiology of Type 3 Neovascularization as Based on Multimodal Imaging Findings <i>Richard Spaide, Vitreous Retina Macula Consultants of NY, USA</i>
11:57-12:05	Morphology of pachychoroid neovascularopathy CNV <i>Bruno Lumbroso, Centro Oftalmologico Mediterraneo, Italy</i>
12:05-12:13	Nonperfusion assessment in retinal vein occlusion: comparison between ultrawide-field fluorescein angiography and large-field OCT-angiography (12mmx12mm) <i>Agnes Glacet Bernard, Centre Hospitalier de Créteil, France</i>
12:13-12:21	Evolution of Type 1 NV and PED in AMD: En Face OCT and OCTA 3D Volumetric Analysis <i>David Sarraf, Stein Eye Institute, UCLA, USA</i>
12:21-12:29	Persistent plaquoid maculopathy <i>Alexander Brucker, Penn Medicine, USA</i>
12:29-12:37	Subretinal Pseudocyst: a novel OCT finding in macular diseases <i>Giuseppe Querques, University Vita-Salute, IRCCS Ospedale San Raffaele, Italy</i>
12:40-13:30	Industry Sponsored Symposium
13:30-14:20	LUNCH AND EXHIBITION VISIT
14:20-15:25	Geographic Atrophy/Myopia/Inflammation <i>Moderators: Emmett Cunningham-USA, Bahram Bodaghi-France, Elias Reichel, USA</i>
14:20-14:28	Predictors of recurrence in patients with retinochoroidal toxoplasmosis <i>Bahram Bodaghi, Sorbonne University, APHP, France</i>
14:28-14:36	Uveitis in the setting of common variable immune disorder <i>Emmett Cunningham, The Francis I. Proctor Foundation, Ucsf, USA</i>
14:36-14:44	The Rate of Progression of Geographic Atrophy Decreases With Increasing Baseline Lesion Size Even After the Square Root Transformation <i>Jordi Monés, Institut de la Màcula, Spain</i>
14:44-14:52	OCT-based classification of myopic maculopathy <i>Kyoko Ohno-Matsui, Tokyo Medical and Dental University, Japan</i>
14:52-15:00	TOGA Study: A Phase II/III Clinical Trial Evaluating Doxycycline for Geographic Atrophy <i>Elias Reichel, Tufts University School of Medicine, USA</i>



SCIENTIFIC PROGRAM

25 JUNE 2019, TUESDAY

Hours	Program
15:00-15:08	Real life study in Uveitis treated with DEXamethasone implant <i>Laurent Kodjikian, Président de la Société Française d'Ophtalmologie (SFO), France</i>
15:08-15:16	Retinal complications of myopia: a cross-sectional study <i>Nicolas Leveziel, Chu (University Hospital Center) de Poitiers, France</i>
15:25-16:05	Macula Surgery <i>Moderators: Ramin Tadayoni-France, Joseph Moisseiev-Israel, Mohamed Bennani, Morocco</i>
15:25-15:33	Vitreoschisis and diabetic vitrectomy <i>Mohamed Bennani, Morocco</i>
15:33-15:41	The outcome of failed pneumatic retinopexy cases <i>Joseph Moisseiev, Sheba Medical Centre, Israel</i>
15:41-15:49	Luxturna, the first approved gene therapy for RPE65 mutation related retinal dystrophy: Our first surgery experience <i>Pierre Olivier Barale, CHNO, France</i>
15:49-15:57	Human Amniotic Membrane plug to promote recurrent macular hole closure <i>Tomaso Caporossi, Clinica Oculistica AOU Careggi Florence, Italy</i>
15:57-16:05	Epiretinal membrane foveoschisis <i>Ramin Tadayoni, Hôpital Lariboisière, AP-HP, Université Paris 7 – Sorbonne Paris Cité, France</i>
16:05-16:35	Lecture: Pitfalls in Publishing-A Roadmap to Acceptance <i>Alexander Brucker, Penn Medicine, USA</i>
16:35-18:05	Retina Games Session <i>Introduction: Eric Souied, Rocio Blanco Garavito, Slim Bodin, Raphaël Barugel</i>  <i>Moderators: Sarah Tick, Raphaël Barugel, Slim Bodin, Manon Ortolí, Hoang Mai Le, Mickael Karcenty</i>  <i>Retina Games Award: Raphaël Barugel, Eric Souied</i>  List of teams: Italy: Maria Vittoria Cicinelli, Eleonora Corbelli, Pasquale Viggiano, Eliana Costanzo, Claudio Iovino Singapore: Sandy Zhou, George Thomas, Beau Fenner, Kelvin Teo UK: Roy Schwartz, Anjali Gupta, Emanuel De Carvalho Israel: Bilal Shehadeh, Muhammad Abumanhal, Mark Krauthammer USA West Coast: Wayne Gui, Cameron Pole, Kirk Hou Switzerland: Maximilian Wiest, Simon Zehnder, Timothy Haman Morocco: Ajdir Sanae, Meryem Filali Ansary, Badreddine Houmane France: Pierre Duraffour, Caroline Bottin, Anthony Amaral
18:05-18:20	Closing





# ABSTRACTS OF INVITED LECTURES



## ABSTRACTS OF INVITED LECTURES

## mTOR Inhibition for Non-Infectious Uveitis and Beyond: The Evolution of Intravitreal Sirolimus through Clinical Trials

Quan Dong Nguyen, MD, MSc

*Byers Eye Institute, Stanford University, Palo Alto, California, USA*

During the last few decades, the treatment paradigm for non-infectious intermediate, posterior, and pan-uveitis, a group of intraocular inflammatory diseases, has included systemic and local (peri- or intra-ocular) corticosteroids, biologics, and other steroid-sparing immunomodulatory therapy (IMT) agents. Recently, an intravitreal (IVT) formulation of sirolimus, an immunosuppressant that inhibits the mammalian target of rapamycin (mTOR), a key regulator of cell growth in the immune system, was developed. On the basis of this mechanism and the local method of delivery, it was hypothesized that IVT sirolimus can improve ocular inflammation in subjects with non-infectious intermediate, posterior, and panuveitis, with minimal systemic exposure and systemic adverse effects (AEs).

The presentation during the 2019 MaculArt Congress will summarize the pharmacokinetics, efficacy, and safety results of IVT sirolimus from three preclinical studies and four Phase I–III clinical studies. Collectively, these preclinical and clinical study data of IVT sirolimus support the therapeutic rationale of treating non-infectious uveitis with a local mTOR inhibitor and suggest that 440 mcg IVT sirolimus has the potential to be an effective and well-tolerated anti-inflammatory and corticosteroid-sparing treatment for non-infectious intermediate, posterior, and pan-uveitis.



ABSTRACTS OF INVITED LECTURES

Home OCT

Comparison Between Retinal Images Captured by a Self-Operated, Home-based Optical Coherence Tomography (OCT) System and Commercial OCT Systems

Anat Loewenstein, MD

*Professor & Director, Dept Ophthalmology, Tel Aviv Medical Center, Incumbent, The Sidney A. Fox Chair in Ophthalmology, Vice Dean, Sackler Faculty of Medicine, Tel Aviv University, Israel*

The American Academy of Ophthalmology's Intelligent Research In Sight (IRIS) Registry is the United State's first comprehensive eye disease and condition registry, and the largest clinical specialty database in the world. Data from this registry show that patients with AMD in the real world are undertreated compared to well-controlled, pivotal clinical trials, regardless of baseline VA or whether it is a patient's first eye or second eye affected. In addition, the high burden to patients and their caregivers of in-office monitoring and treatment visits has a negative impact on patient compliance. As long-term accumulation of retinal fluid, or extended fluid residence time (FRT), causes visual acuity loss, it is of paramount importance to reduce the FRT to a minimum. Home OCT has the potential to decrease FRT through personalization of care by optimizing individual treatment intervals. Continuous retinal monitoring with Home OCT may identify the best therapeutic window for an anti-VEGF agent while also optimizing the number of retreatments, and reducing the burden on patients and caregivers.

A clinical study was performed to evaluate the performance of a self-operated home OCT device (Notal OCT V2.5) in retinal fluid detection in AMD patients, compared with commercial OCT devices, and in patient usability of the device. Fluid detection sensitivity of the home OCT device was 95% and specificity 96% when compared with commercial OCT devices (Zeiss, Cirrus and Heidelberg Engineering, Spectralis) in an interim analysis. Following instructions with a 2 minute video, 94% of patients successfully self-operated the home OCT device and captured gradable images of their maculas. The 6% of patients who were not able to self-operate the device did not demonstrate comprehension of the use instructions. Patient feedback on device usability was consistently positive.



ABSTRACTS OF INVITED LECTURES

Chorioretinal folds associated with central serous chorioretinopathy

Salomon Yves Cohen

*CIL - Centre Ophtalmologique d'Imagerie et de Laser, France*

**Background and Purpose:** To our knowledge, an association between central serous chorioretinopathy (CSC) and chorioretinal folds is not reported except as a short mention in Gass' stereoscopic atlas. We report on 6 cases with this association.

**Methods:** Six patients with both conditions were examined in our institution. They were examined with fluorescein angiography, and optical coherence tomography.

**Results:** Patients were 3 men and 3 women, aged from 44 to 82 years. All had hyperopia and two used corticosteroids. Fluorescein angiography showed pigmentary changes, diffuse leakage areas typical of chronic CSC, and chorioretinal folds mostly located in the upper temporal part of the fundus. Enhanced depth imaging-optical coherence tomography was performed in 5 cases and revealed a thick choroid in all cases (mean of the subfoveal choroidal thickness: 381  $\mu$ m, range: 280-510  $\mu$ m).

**Conclusions:** While possibly coincidental, the occurrence of chorioretinal folds in hyperopic CSC eyes may result from a lack of adequacy between the excessive thickness of the choroid compared to other layers of the fundus in eyes with short axial length.



## ABSTRACTS OF INVITED LECTURES

### Recent Applications of Deep Learning AI in Age-related Macular Degeneration

Neil Bressler on behalf of Philippe M. Burlina, Neil Joshi, Katia D. Pacheco, David E. Freund, Jun Kong, MD, T. Y. Alvin Liu

Although deep learning (DL) can identify the intermediate or advanced stages of age-related macular degeneration (AMD) as a binary yes or no, stratified gradings using the more granular Age-Related Eye Disease Study (AREDS) 9-step detailed severity scale for AMD provide more precise estimation of 5-year progression to advanced stages. The AREDS 9-step detailed scale's complexity and implementation solely with highly trained fundus photograph graders potentially hampered its clinical use, warranting development and use of an alternate AREDS simple scale, which although valuable, has less predictive ability. To determine how accurate deep learning algorithms are for characterizing AMD from fundus images, assessing AREDS 4- and 9-step detailed severity scales, and determining 5-year risk of progression to advanced stages of age-related macular degeneration, one study used 67 401 color fundus images from 4613 study participants of the Age-Related Eye Disease Study data set. Linearly weighted scores for estimating 4- and 9-step severity scale scores showed substantial agreement using gradings from highly trained fundus photograph graders as the criterion standard. The results of this study suggest that deep learning assists in a detailed 9-step severity assessment of age-related macular degeneration and estimating 5-year risk of progression to advanced age-related macular degeneration with reasonable accuracy. (Adapted from Use of Deep Learning for Detailed Severity Characterization and Estimation of 5-Year Risk Among Patients With Age-Related Macular Degeneration. JAMA Ophthalmol. 2018;136(12):1359–1366. doi:10.1001/jamaophthalmol.20184118).

While DL used for discriminative tasks in ophthalmology, such as diagnosing diabetic retinopathy or AMD, requires large image data sets graded by human experts to train deep convolutional neural networks (DCNNs), generative DL techniques could synthesize large new data sets of artificial retina images with different stages of AMD. Such images could enhance existing data sets of common and rare ophthalmic diseases without concern for personally identifying information to assist medical education of students, residents, and retinal specialists, as well as for training new DL diagnostic models for which extensive data sets from large clinical trials of expertly graded images may not exist. Therefore, deep learning was used to synthesize fundus images of AMD that appeared realistic to retinal specialists. In a study of fundus images from 4613 study participants from AREDS and 133 821 fundus images, the ability of 2 retinal specialists to distinguish real from synthetic fundus images of varying stages of AMD was close to chance, and their diagnostic accuracy similar for real and synthetic images. Machines trained with only synthetic images showed performance nearing that resulting from training on real images. These findings suggest that deep-learning–synthesized fundus images of AMD are realistic and could be used for education of humans across various levels of expertise and for machine training. (Adapted from Assessment of Deep Generative Models for High-Resolution Synthetic Retinal Image Generation of Age-Related Macular Degeneration. JAMA Ophthalmol. 2019;137(3):258–264. doi:10.1001/jamaophthalmol.2018.6156)





## ABSTRACTS OF INVITED LECTURES

### Artificial intelligence for morphology-based function prediction in neovascular age-related macular degeneration

Steffen Schmitz-Valckenberg, Leon von der Emde, Maximilian Pfau, Matthias Schmid,  
Monika Fleckenstein, Frank G. Holz

**Purpose:** To investigate the impact of retinal microstructure on cone and rod function in neovascular age related macular degeneration (nAMD) and to apply machine learning algorithms in order to predict functional impairment based on multimodal imaging findings.

**Methods:** Fifty eyes of 50 nAMD patients (age  $76.1 \pm 7.6$  years) and 40 eyes of 40 normal subjects ( $58.0 \pm 17.4$  years) underwent multimodal imaging and duplicate mesopic and two-color dark-adapted (DA) perimetry using the S-MAIA device (S-MAIA, CenterVue, Italy). Normative perimetry data for an average 76 year old healthy subject were obtained through point-wise linear regression. The outer nuclear layer (ONL), inner (IS) and outer photoreceptor segments (OS) and retinal-pigment-epithelium-drusen-complex (RPEDC) were semi-automatically annotated in spectral domain optical coherence tomography (SD-OCT) scans (121 B-scans,  $30^\circ \times 25^\circ$ , Spectralis OCT2, Heidelberg Engineering, Germany). Fundus-controlled perimetry (FCP) data were registered to SD-OCT and fundus autofluorescence (FAF) data to obtain thickness and intensity data spatially corresponding to the stimulus-location and area ( $0.43^\circ$ ). Using random forest (RF) regression with patient-wise leave-one-out cross validation (LOO-CV), we evaluated the prediction accuracy of inferred sensitivity based on the mean absolute error (MAE) and the feature importance (increase in mean squared error [% Inc MSE]).

**Results:** Prediction accuracies with patient-wise LOO-CV (MAE [95% CI]) were 3.89 dB [3.36, 4.41] for mesopic, 4.94 dB [4.61, 5.27] for DA cyan and 3.99 dB [3.6, 4.39] for DA red testings. With partial addition of patient-specific sensitivity data, the errors were decreased to 2.83 dB [2.53, 3.12], 3.75 dB [3.51, 3.99] and 2.87 dB [2.66, 3.09], respectively. For all three types of testing, ONL thickness constituted the most important predictive feature (59.3 % IncMSE, 87.8 % IncMSE, 103.91 % IncMSE).

**Conclusions:** Retinal structural abnormalities may exhibit differential, yet predictable effects on cone and rod function in nAMD. "Inferred sensitivity", obtained by artificial intelligence allows for high-resolution en face mapping of retinal sensitivity for diagnosis and monitoring of macular visual field losses. Refined volumetric visual field indices could be suitable as a surrogate endpoint in clinical trials.



## ABSTRACTS OF INVITED LECTURES

### A Telemedicine Deep Learning Platform for AMD

Roland Theodore Smith

*Mount Sinai School of Medicine, USA*

**Purpose:** To construct an accurate artificial intelligence (AI) detection/prediction model based on retinal color fundus photographs (CFPs) of the risk of developing late (dry or wet) age-related macular degeneration (AMD), thus enabling improved opportunities to prevent the progression of intermediate AMD (iAMD) to late AMD (i.e., irreversible blindness).

**Methods:** CFPs from The Age-related Eye Disease Study (AREDS), the largest AMD study, were used to train and validate our models. 4,757 participants were enrolled in AMD categories no, early, intermediate and late.

We first built a deep learning AI screening model from 116,875 graded AREDS CFPs to classify them as either early/none or intermediate/late AMD. This model achieved 99.2% accuracy, the highest reported (1) among such approaches. We then refined our deep learning classifier to identify AREDS severity classes 1-9 (2) and additionally the presence or absence of RPD. We also automatically extracted CFP specific parameters: drusen information (size, change in drusen area with time, number larger than 125 microns) and pigment abnormalities(3), and included the demographic factors age, race, sex, diabetic status, BMI and sunlight exposure. We then used 7611 images of 3535 iAMD eyes for which 2 year follow was available. Out of these, 2381 images (1188 eyes) belonged to 923 individuals who had either one or both their eyes progress to late AMD in 2 years. For the progressors, CFPs were chosen from the visit 2 years prior to progression. For the non-progressors, CFPs were chosen from the last visit and the visit 2 years prior. A neural network machine learning model based on all parameters at the first visit, AREDS severity class, +/- RPD, CFP specific parameters and demographic factors, was built to predict progression at the two year visit. We further considered the AREDS supplements and placebo groups separately.

**Results:** The prediction model for the 2-year incidence of late AMD achieved 884% accuracy with sensitivity 92.1% and specificity 84.3%. For late dry AMD, the model achieved 66.9% accuracy, and for late wet AMD, 67.8% accuracy. Results were essentially unchanged by considering the treatment and placebo groups separately.

**Conclusions and Relevance:** We have developed the first color fundus photo-based model for both screening AMD and prediction of developing late AMD. To assist us in the early treatment and best care of this disease, the model will be deployed and tested in remote clinics for telemedicine application.

Govindaiah A. Hussain MA, Smith RT, Bhuiyan A, 2018 IEEE International Symposium on Biomedical Imaging

Govindaiah A, Smith RT, Bhuiyan A. Conf Proc IEEE Eng Med Biol Soc. 2018

Hussain MA. Govindaiah A, Souied E, Smith RT, Bhuiyan A. IEEE ICIEV. 2018:1-5.



ABSTRACTS OF INVITED LECTURES

Artificial Intelligence in Ophthalmology - the Moorfields-DeepMind Collaboration

Pearse Keane

*Moorfields Eye Hospital Nhs Foundation Trust, United Kingdom*

Ophthalmology is among the most technology-driven of all the medical specialties, with treatments utilizing high-spec medical lasers and advanced microsurgical techniques, and diagnostics involving ultra-high resolution imaging. Ophthalmology is also at the forefront of many trailblazing research areas in healthcare, such as stem cell therapy, gene therapy, and - most recently - artificial intelligence. In July 2016, Moorfields announced a formal collaboration with the world's leading artificial intelligence company, DeepMind. This collaboration involves the sharing of >1,000,000 anonymised retinal scans with DeepMind to allow for the automated diagnosis of diseases such as age-related macular degeneration (AMD) and diabetic retinopathy (DR). In my presentation, I will describe the motivation - and urgent need - to apply deep learning to ophthalmology, the processes required to establish a research collaboration between the NHS and a company like DeepMind, the initial results of our research, and finally, why I believe that ophthalmology could be first branch of medicine to be fundamentally reinvented through the application of artificial intelligence.



ABSTRACTS OF INVITED LECTURES

Developing Human Based Intuitive Machine Learning Algorithms for Analyzing Intermediate AMD OCT Images

Csaky, KG<sup>1</sup>, Oulette, M<sup>2</sup> and Corey, C<sup>2</sup>.

<sup>1</sup>Retina Foundation of the Southwest, Dallas, TX

<sup>2</sup>Southern Methodist University Guildhall Computer Science and Engineering Plano, TX

While automated evaluation procedures exist to quantitate various anatomic aspects of optical coherence tomography (OCT), OCT analysis of eyes with intermediate age-related macular degeneration (iAMD) often requires verification or modification by a trained OCT evaluator. Newer modalities including various machine learning approaches are under investigation in an attempt to automate the analysis as well as understanding algorithmic approaches to defining anatomic characteristics that correlate with iAMD progression. Human computing has proven to be an effective way to crowdsource a variety of scientific problems, as well as to leverage human pattern-recognition ability. Video games allow users to interact with the scientific data while also leveraging the elements game developers require to maintain engagement. To investigate whether game interactions can train players to evaluate iAMD OCT images, a web-based game, Eye in the Sky: Defender, was created featuring gameplay designed around quantification of drusen. Evaluations of accuracy using the mean user line input reflected 86% improvement from a players' initial image evaluation. Spearman rank correlation and Procrustes analysis indicate mean line accuracy within 10% margin of error by image 4 and improved results compared to the automatically generated line in more challenging images. The preliminary result of this approach allowed the development of a human intuition filter that, when combined with standard machine learning, improved precision and accuracy of drusen identification with fewer OCT image inputs. These results suggest human computation games can be used to expedite algorithmic development of iAMD OCT analysis.



ABSTRACTS OF INVITED LECTURES

Comparing Automated Quantitative OCTA Measurements of Uveal Melanoma Treated Eyes with and without Radiation Retinopathy after I-125 Plaque Therapy

William F. Mieler, MD, Talisa De Carlo, MD

*University of Illinois at Chicago, Chicago, IL*

**Purpose:** To determine if commercial OCTA measurements can provide quantitative markers for detection of radiation retinopathy (RR) s/p I-125 plaque brachytherapy for uveal melanoma. **Methods:** Retrospective review of 6x6mm OCTA images of non-irradiated fellow eyes (group 1, 28 eyes), eyes without RR s/p I-125 plaque brachytherapy (group 2, 22 eyes), eyes with RR s/p I-125 plaque brachytherapy (group 3, 13 eyes). We used automated AngioVue OCTA software determinations of FAZ size, perimeter size, and 27 capillary density measurements (nine ETDRS grid regions of each segmentation: full-thickness inner retina, superficial plexus, deep plexus). **Results:** Average years since irradiation was 1.9 in group 2, 3.7 in group 3. FAZ size was 1.2mm in group 3 compared with 0.2mm in group 1 and 0.3mm in group 2 (both  $p < 0.001$ ). Perimeter size was also significantly different between groups 1 and 3 ( $p < 0.001$ ), and groups 2 and 3 ( $p = 0.047$ ). Capillary density was statistically significantly reduced in group 3 compared with group 1 in all 27 regions. Group 2 had decreased superficial plexus capillary density compared with group 1 of the entire and most parafoveal ETDRS regions. The deep plexus and full thickness density measurements were not a significantly different between groups 1 and 2. Finally, group 3 had statistically significantly reduced capillary density compared with group 2 in 17/27 (63%) ETDRS grid regions. **Conclusions:** Quantitative OCTA may aid in early detection of RR particularly using FAZ and perimeter sizes and superficial capillary plexus density measurements.





## ABSTRACTS OF INVITED LECTURES

### Detection of Retinal Arterial (micro-)Emboli after Transcatheter Aortic Valve Implantation using OCTA and Fluorescence Angiography

Zweifel SA, Gunzinger J, Baur J, Ibrahim B, Straumann D, Pangalu A, Piccirelli M, Nietlisbach F.

**Purpose:** Transcatheter aortic valve implantation (TAVI) is a new therapeutic option for aortic valve replacement. Different studies showed new clinically silent ischemic lesions in the brain in approximately 70% of patients after TAVI. The purpose of this project is to investigate whether silent embolic incidences in the brain seen in MRI after TAVI can also be found in the retinal vessels.

#### Setting/Venue

**Methods:** Prospective study of patients undergoing TAVI: A MRI of the brain (sequences: diffusion weight, Flair and T2), wide field fluorescein angiography (FA) and swept-source optical coherence tomography angiography (SS OCTA) were acquired in 21 eyes of 13 patients pre- and post-procedure. OCTA images (3x3 mm, 6x6 mm, 9x15 mm cube centered on the fovea and widefield) were acquired. Quantitative analysis of the size of the foveal avascular zone (FAZ), the vessel density (VD) of the superficial (SCP) and deep capillary plexus (DCP) was performed manually using the 3x3 and 6x6 mm macular data sets.

**Results:** The mean age of the patients (10 men, 3 women) was 79±6 years. Best corrected visual acuity (BCVA) was 84±6 letters (ETDRS) pre TAVI and 85±6 letters post TAVI. In seven patients diffusion-weighted magnetic resonance imaging lesions post TAVI were detected. Qualitative analysis of the widefield montage OCT A images did show new zones of capillary dropouts post TAVI compared to pre TAVI images in 3 eyes. No embolic lesions in the retinal vessels were found using widefield FA post TAVI. The mean VD of the SCP (3x3mm) was 0.337±0.049 mm<sup>2</sup> pre TAVI and 0.345±0.036 mm<sup>2</sup> post TAVI. The mean superficial FAZ area was 0.236±0.133 mm<sup>2</sup> pre TAVI and 0.231±0.135 mm<sup>2</sup> post TAVI.

**Conclusions:** Qualitatively new zones of capillary dropouts after TAVI could be detected, quantitatively the vascular density in the macular area did not change post TAVI. Unfortunately reliable quantitative analysis of the widefield OCTA data failed due to insufficient data quality. With the technological improvements, we believe OCTA will become an important part in diagnosing embolic incidence in TAVI patients.

**Legend:** Optical coherence tomography (OCTA) images of the superficial capillary plexus (6x6) of the right eye of a 76-year-old male patient pre (A) and post TAVI (B). Note the new zone of capillary dropout post TAVI (white arrow in B).



ABSTRACTS OF INVITED LECTURES

Morphofunctional analysis of the retina in type 1 diabetic patients without complications after 30 years of disease

Francesco Bandello, MD;<sup>1</sup> Riccardo Sacconi, MD;<sup>1</sup> Francesca Lamanna, MD;<sup>1</sup> Enrico Borrelli, MD;<sup>1</sup>  
Giuseppe Querques, MD, PhD.<sup>1</sup>

*Department of Ophthalmology, University Vita-Salute, IRCCS Ospedale San Raffaele, Milan, Italy*

**Background:** To investigate structural and vascular retinal changes, as well as macular sensitivity, in patients with long-term type 1 diabetes mellitus (T1DM) and without evidence or history of systemic and ocular complications.

**Methods:** In this prospective study, 12 T1DM patients without diabetes-related complications and 12 healthy age-matched controls were enrolled. All subjects underwent a comprehensive ophthalmologic examination, including spectral domain optical coherence tomography (SD-OCT), OCT angiography (OCTA), and microperimetry.

**Results:** On OCTA, patients and controls did not display differences in foveal avascular zone (FAZ) size, perfusion and vessel length density, and vessel tortuosity. On structural OCT, both the retinal nerve fiber layer (RNFL) and ganglion cell complex (GCC) analyses did not show significant differences. Macular sensitivity did not significantly differ between patients and controls.

**Conclusions:** Long-term T1DM patients without diabetes-related complications ("happy-few" sub-group) did not show retinal alterations. This highlights the ability of retinal imaging as a screening tool in diabetes. The characterization of these patients may help to identify potential biomarkers for disease progression and new targets for pharmacological treatment.



ABSTRACTS OF INVITED LECTURES

The Correlation of Response to Treatment with anti-VEGF compounds between the First and Second Treated Eyes in Diabetic Macular Edema

Itay Chowers, Nadav Levinger, Elishai Assayag, Tomer Batash, Jaime Levi, Liran Tiosano.

*Department of Ophthalmology, Hadassah-Hebrew University Medical Center, Jerusalem, Israel.*

**Purpose:** Diabetic Macular Edema (DME) often affects fellow eyes of an individual patient. It is unclear if treatment outcome in one eye can predict the outcome and/or guide treatment in the fellow eye. We evaluated the correlation between the response of fellow eyes for bilateral anti-VEGF treatment in DME.

**Methods:** Clinical and imaging data was collected retrospectively on a consecutive group of 138 eyes (n=69 patients) which underwent first-line bevacizumab therapy (64 eyes), or second-line ranibizumab therapy (74 eyes) for DME. Correlation of treatment outcome was evaluated between both eyes.

**Results:** In eyes that underwent first-line bevacizumab therapy, the baseline (mean±SD) central subfield thickness (CST) was similar in the 1st injected eye (453±179 micron) and the 2nd injected eye (403±160 micron; P>0.05). Correlation between the CST of the fellow eyes was present after three injections (r=0.388; P=0.025), but not after the 6th bevacizumab injection (r= -0.96; P>0.05). 7 patients (11%) showed >100-micron difference in CST response to treatment between fellow eyes. In eyes under second-line ranibizumab therapy, the number of bevacizumab injections (mean±SD) prior to the ranibizumab switch was 11.0±5.1 in the 1st injected eye and 10.9±5.2 in the 2nd injected eye. The CST was similar between the fellow eyes prior to the switch (1st eye: 418±12 micron, 2nd eye 446±12 micron; P=0.22). At the end of the follow up (after 3 ranibizumab injections), the CST was different between the fellow eyes (1<sup>st</sup> eye: 365±74, 2<sup>nd</sup> eye: 421±1; p=0.004), but, the CST change under ranibizumab therapy correlated between the fellow eyes (Pearson correlation coefficient=0.418; p=0.04).

**Conclusions:** Response for first-line and second-line anti-VEGF therapy shows correlations between fellow eyes. Yet, individual patients with bilateral DME may have variable response to the same compound in fellow eyes.



ABSTRACTS OF INVITED LECTURES

Exploratory Analysis of Change in Visual Fields Over 5 Years Among Eyes with Proliferative Diabetic Retinopathy

Michael J. Elman

*DRCR Retina Network*

**Objective:** To examine the loss of Humphrey visual fields over 5 years among eyes with proliferative diabetic retinopathy (PDR) managed by panretinal photocoagulation (PRP) or intravitreal injections of ranibizumab.

**Materials & Methods:** In an ancillary study, visual field (VF) data were collected from participants enrolled in a subset of clinical sites participating in a randomized clinical trial (Protocol S) by the DRCR Retina Network. At baseline and each annual visit, visual field testing was performed using Humphrey Field Analyzer (HFA). The main outcome of this preplanned secondary analysis was the change in total point score from baseline combining 30-2 and 60-4 test patterns. **Results:** A total of 167 eyes (81 ranibizumab group; 86 PRP group) had VF data meeting the quality criteria for both test patterns at the baseline visit. Mean (SD) baseline total point score combining two test patterns was 3365 (759) dB and 3487 (659) dB in the ranibizumab and PRP groups, respectively. 5-Year VF data were available for 79 (47%) eyes (41 ranibizumab group; 38 PRP group), and the mean (SD) change in the cumulative total point score from baseline was -330 (645) dB and -527 (635) dB in the ranibizumab and PRP groups, respectively (mean [95% CI] treatment-group difference: 208 [9, 408] dB; P value = 0.04). After censoring VF data in the ranibizumab group for eyes receiving PRP treatment, the mean (SD) change at 5 years was -201 (442) dB.

**Conclusions:** The limited data from this ancillary study suggest that eyes treated with PRP or ranibizumab for PDR experienced loss in visual field. Over 5 years, the PRP group had more substantial loss in VF sensitivity than the ranibizumab group. To investigate factors besides PRP that may be associated with VF loss in eyes with PDR, further research is warranted.

**Financial Disclosure:** Genentech/Roche, Alcon, Novartis, Jaeb Center



## ABSTRACTS OF INVITED LECTURES

### OCT Central Subfield Thickness and Visual Acuity in DME: Correlation, or Lack Thereof

Neil Bressler

*Wilmer Eye Institute, USA*

Associations of 2-year visual acuity (VA) outcomes with VA and optical coherence tomography central subfield thickness (CST) after 12 weeks of anti-vascular endothelial growth factor treatment for diabetic macular edema in the DRCR Retina Network Protocol T were assessed within a randomized clinical trial across 89 U.S. sites of patients with at least one eye with VA and CST data from baseline and 12-week visits (616 of 660 eyes randomized [93.3%]). Following six monthly injections of 2.0-mg aflibercept, 1.25-mg bevacizumab, or 0.3-mg ranibizumab, with subsequent injections and focal/grid laser as needed per protocol for stability, 12-week VA response was associated with 2-year change in VA and 2-year VA letter score for each drug ( $P < .001$ ) but with substantial individual variability (multivariable  $R^2$  [0.38, 0.29, and 0.26 for

2-year change with aflibercept, bevacizumab, and ranibizumab, respectively). Among eyes with less than 5-letter gain at 12 weeks, the percentages of eyes gaining 10 or more letters from baseline at 2 years were 42% (20 of 48), 31% (21 of 68), and 47% (28 of 59), and median 2-year VA was 20/32, 20/32, and 20/25, in the aflibercept, bevacizumab, and ranibizumab groups, respectively. Twelve-week CST response was not strongly associated with 2-year outcomes. These findings suggest a suboptimal response at 12 weeks did not preclude meaningful vision improvement (i.e.,  $\geq 10$  letter gain) in many eyes at 2 years. Eyes with less than 5-letter gain at 12 weeks often had good VA at 2 years without switching therapies.

(Adapted from (Bressler NM, Beaulieu WT, Maguire MG et al for the DRCR Retina Network: Am J Ophthalmol 2018;195:93–100. © 2018 Elsevier Inc.)





ABSTRACTS OF INVITED LECTURES

Role of Genetic Testing in Retinal Diseases

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Since the completion of the Human Genome project there has been over 300 genes associated with retinal degeneration (retinal dystrophies). The understanding of the molecular basis of retinal degeneration is steadily increasing which has brought us in a new era of personalized genetic diagnosis and gene based therapy. This cannot be achieved without genetic testing which is looking for the variant in the genome that is specific to the condition studied. The most common approach to genetic testing today is through the sequence analysis of the coding sequence of panels of genes. This leads to a large amount of information that must be interpreted with caution as not all variants identified are of significance. A genetic result cannot be interpreted without a known mode of inheritance and a phenotype. A genetic diagnosis can be obtained in ~60% of 'inherited' retinal dystrophies.



## ABSTRACTS OF INVITED LECTURES

### New Insights into the Genetic Basis of Macular Telangiectasia Type 2 (MacTel)

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**Purpose:** Macular telangiectasia type II (MacTel) was once thought to be a rare, sporadic maculopathy with no effective treatment options. More recently, it has become clear that MacTel is much more common than previously appreciated and that it likely has a significant genetic etiology because parent-child transmission and affected sib-pairs are occasionally seen. Fifteen years ago, the MacTel project was initiated as a multicenter research consortium to elucidate the underlying causes of MacTel and to develop novel mechanism-based treatments for this debilitating visual disorder. The Utah Center for MacTel Genetics sub-study was established to utilize the unique genetic resources of the Intermountain West to collect families with multiple affected family members to aid in gene discovery for this condition.

**Methods:** We systematically examined all available first degree family members of Utah and Idaho MacTel probands to ascertain apparent genetic penetrance of MacTel and to assemble large pedigrees for gene discovery studies. We then use the Utah Population Database (UPDB) to construct larger MacTel superfamilies of distantly related probands. For children of MacTel probands who are typically too young to manifest the disease, we use fluorescence lifetime imaging ophthalmoscopy (FLIO) to identify characteristic parafoveal changes associated with MacTel that appear to identify individuals at future risk for visual loss from MacTel.

**Results:** We have fully characterized seven Utah/Idaho MacTel families with multiple affected family members. From these studies, we can calculate an apparent genetic penetrance of 38% in MacTel parents and siblings under an autosomal dominant model. FLIO abnormalities are detectable in nearly 40 % of children of MacTel probands, consistent with autosomal dominant transmission of genes predisposing to MacTel. One particularly informative MacTel family showed co-segregation of MacTel with the rare peripheral neuropathy HSAN1 secondary to an SPTLC1 mutation that leads to disruption of sphingolipid metabolism and accumulation of neurotoxic deoxyceramides.

**Conclusions:** Our results demonstrate that MacTel behaves as a late-onset, autosomal dominant disease with incomplete penetrance. Mutations in SPTLC1 and related genes are rare highly penetrant causes of MacTel, but metabolomic studies on larger MacTel cohorts confirm that sphingolipid abnormalities are indeed common in MacTel patients, presumably due to genetic defects in other enzymes in this very complex metabolic pathway. Discovery of genetic causes of MacTel pave the way for novel targeted interventions against this disorder.

**Financial disclosure:** This work was supported by the Lowy Medical Research Institute (LMRI). Heidelberg Engineering provided the prototype FLIO device at no charge to the University of Utah.



ABSTRACTS OF INVITED LECTURES

**A Composite, Polygenic Prediction Model is Validated in an External Cohort for Macular Degeneration Progression and Predictors of Incident Advanced AMD and Visual Acuity Loss Identify High Risk Individuals**

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**Purpose:** To determine predictive factors and risk scores for conversion from non-advanced to advanced age-related macular degeneration (AMD), geographic atrophy (GA), neovascular disease (NV), and loss of vision, and to derive and validate a model for AMD progression in an external cohort.

**Methods:** Progression to advanced AMD over 12 years was evaluated using stepwise survival analysis in the derivation cohort with the eye as the unit of analysis (n=5355 eyes), accounting for competing risks and correlation of outcomes in the 2 eyes. Risk scores which included data on genetic, demographic (age, gender, race, education), behavioral (smoking, BMI) and ocular factors (baseline AMD grade), were derived for three advanced AMD endpoints and were validated and calibrated in our large, independent cohort (n=3955 eyes). Vision loss of 15 or more letters was evaluated as a new endpoint in genetic analyses.

**Results:** Eight common and rare variants in genes CFH, C3, ARMS2, COL8A1, and HSPH1/B3GALT conferred a significantly higher risk of transition to advanced AMD. Three loci (C2, CFB, RAD51B) were associated with lower rate of progression. A protective effect was suggested for variants in the genes CTRB1 and PELI3. The age-adjusted area under the curve (AUC) for the composite model including 13 loci model was 0.900 over 12 years (0.896 in the validation cohort). Genetic factors added to the model: progressors had a higher risk category and non-progressors had a lower risk category when genetic factors were considered. Eyes with the same baseline macular grade had a wide range of estimated probability of subsequent progression and visual loss based on the validated risk score. Furthermore, there was heterogeneity between models for GA and NV with some differences in predictors for these two endpoints. The prediction model was calibrated in the validation cohort. Determinants of visual loss included age, education, BMI, smoking, and several common and rare genetic variants.

**Conclusions:** A model which includes both genetic and non-genetic variables yields meaningful risk stratification among eyes with a similar baseline macular phenotype, and can predict high and low risk for developing advanced disease and losing vision over time. Identifying high risk individuals at an earlier stage using predictive modeling could lead to targeted preventive and therapeutic strategies in the era of precision medicine.



## ABSTRACTS OF INVITED LECTURES

## Rare eye diseases, two examples of French & European expert networks, SENSGENE and ERN-EYE

Pr H  l  ne Dollfus

*French Network SENSEGENE (<https://www.sensgene.com/>)*

The French network SENSGENE, created in 2014 by Ministry of Health, is coordinated from the Hôpitaux Universitaires de Strasbourg, France, by Pr Hélène Dollfus. It carries out national missions around rare sensory diseases. These include rare diseases of the eye, ear and visual and/or hearing impairments that also affect other organs.

SENSGENE particularly fulfils three major missions: improving patient care, coordinate and encourage research, develop training and information.

SENSGENE is divided into 67 expert centres. These centres are certified and made up of highly specialized, multi-professional and multidisciplinary university hospital teams with proven expertise in care, research and training. It is thanks to these centres that the actions of SENSGENE can be carried out.

The SENGGENE network also works with many associations that help and support patients in their daily activities.

European Reference Network ERN-EYE (<https://www.ern-eye.eu>)

ERNs are European reference networks developed by the European Commission, bringing together expert hospitals across Europe to improve access to highly specialized healthcare.

ERN-EYE is constituted of 29 members in 13 countries across European Union to guarantee the best coverage of more than 900 Rare Eye Diseases. The coordinator is Pr Hélène Dollfus, Hôpitaux Universitaires de Strasbourg, France. All members were approved by their national authority and positively assessed by an independent body.

The Networks main aim is the development of a virtual clinic to facilitate cross-border dissemination of expertise through a virtual clinic: The Clinical Patient Management System (CPMS).



## ABSTRACTS OF INVITED LECTURES

### Long term outcomes in the IVAN clinical trial

Usha Chakravarthy

*Queen's University, United Kingdom*

**Purpose:** To analyze treatment rates in study eyes during an extended period of follow up after release from protocol in participants who were enrolled in the IVAN clinical trial.

**Methods.** On exiting IVAN participants had their clinical care transferred into the UK's national health service. Of the 610 enrolled in IVAN, 532 were alive and had not withdrawn and were eligible to take part in the extended follow up. Ethics approval allowed for participants to be invited to attend a research visit or if the participant did not wish to attend or was deceased prior to data collection in the extended follow up period, for data from all routine visits to be accessed (passive data collection). Research visits and passive data retrieval occurred between May 2016 and June 2017. Data from every visit was extracted along with VA and treatments administered to each eye. For participants who attended the research visit BCVA, LLA and macular imaging was performed. For those patients who did not attend, images of the most recent visit were extracted and graded for signs of lesion activity, lesion area, atrophy and fibrosis.

**Analysis.** The mean, median of DVA at the last recorded visit after IVAN exit by type of follow up in survivors and deceased patients were computed. The change in DVA, visit and injection rates for each year of follow up by BCVA category at IVAN exit was computed. We defined duration of follow up as the length of time between IVAN exit and cessation of active management (visits in which study eye was being actively treated or monitored). This measure was used to compute the rate of change in DVA/year, injection and visit rates for study eye management and associations of covariates were estimated from a multivariable linear random effects model with time as a random effect. Covariates included were age at IVAN exit, sex, index of multiple deprivation (IMD), presence of nAMD in fellow eye at IVAN exit, status of fellow eye better or worse than study eye based on BCVA at IVAN exit, injection rate in study eye in preceding year and proportion change in lesion size between IVAN entry and IVAN exit.

**Results:** At the end of study eye monitoring, the median DVA of the entire group was 58.0 letters (IQR 34.0, 73.0), 14 letters worse compared to that at IVAN exit {72.0 letters, IQR 56.0, 80.0} median change -10 letters, [IQR -22.0 to -2.0]. One third had a VA better than 68 letters. One fifth (20.8%) had a VA of worse than 33 letters (20/200) and half of these (8.8%) had a VA worse than 18 letters.

Those who had died had the shortest duration of follow up. Survivors who attended and those whose data was acquired passively had similar duration of follow up. Neither injection or visit rate was affected by BCVA category at IVAN exit except for those in the worst VA category (< 37 letters at IVAN exit) who had the lowest injection and visit rates. The multivariable model estimated the reduction in DVA during study eye monitoring to be -4.3 letters per year (95% CI 3.7 to 4.9). The only significant interaction was between age and time ( $p < 0.001$ ); with DVA deteriorating much faster in older participants and in the group who died after IVAN exit but before data collection in the extended follow up period.

**Conclusions:** Despite intensive follow up and treatments with anti VEGF the DVA in study eyes deteriorated over time with an average loss of around 4 letters per year.



ABSTRACTS OF INVITED LECTURES

Can AMD Treat Itself?

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**Purpose:** To correlate multimodal retinal imaging with high-resolution epoxy resin histology aligned to in vivo tomograms in a patient with non-exudative type 1 macular neovascularization (MNV) secondary to age-related macular degeneration (AMD).

**Subject:** A 79-year-old female of European descent who following loss of central vision due to neovascular AMD in one eye retained 20/30 visual acuity in her fellow eye which had untreated non-exudative type 1 MNV documented with multimodal imaging over a >9-year follow-up.

**Methods:** Retinal imaging, including fluorescein angiography, fundus autofluorescence, and eye-tracked spectral domain optical coherence tomography (OCT), was correlated with ex vivo OCT and high-resolution histologic images of the donor eye. Outer retina status was determined by comparing OCT layer thicknesses at 10 years and 1 year prior to patient death.

**Results:** Histologic analysis showed extensive type 1 MNV comprised of fibrovascular tissue with capillaries and small vessels, stroma, cells of retinal pigment epithelium (RPE) and non-RPE origin, and hemorrhage. The MNV was absent from surrounding regions not covered by the RPE elevation. The total area of histologically confirmed NV was 13.38 mm<sup>2</sup>, similar to that measured from OCT at the last clinic visit (13.70 mm<sup>2</sup>), despite the passage of 17 months. Transmission electron microscopy showed fenestrations and caveolae (transport vesicles) in neovessels beneath the RPE, as they were in native choriocapillaris. Over 9 years of tracked-OCT, the thickness of the anatomical Henle fiber layer-outer nuclear layer in the foveal subfield, inner ring and outer ring of the ETDRS grid overlying the type 1 MNV decreased by only 4 µm, 2 µm and 6 µm respectively.

**Conclusion:** This first clinicopathologic correlation of non-exudative type 1 MNV appearing as a shallow irregular RPE elevation on structural OCT shows the potential for this neovascular subtype to recapitulate the morphology of the native choriocapillaris and support the overlying RPE and photoreceptors in eyes with neovascular AMD.



## ABSTRACTS OF INVITED LECTURES

### Brolucizumab: A reduction in treatment burden is likely

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*Retina Associates of Cleveland, Clinical Professor of Ophthalmology, Case Western Reserve University  
and Bascom Palmer Eye Institute*

Brolucizumab is a single-chain antibody fragment with a high affinity for and potent inhibition of all VEGF-A isoforms. Its characteristics include small size—it is smaller than ranibizumab, aflibercept, or bevacizumab—as well as rapid systemic clearance. Two Phase III studies, HAWK and HARRIER, compared intravitreal brolucizumab with intravitreal aflibercept for the treatment of neovascular macular degeneration (nAMD).

The HAWK study was performed in North, Central, and South America; Israel; Australia; New Zealand, and Japan. The HARRIER study was done in Europe and Asia. Together, the studies enrolled more than 1800 patients at more than 400 sites. The HAWK study compared 3 or 6 mg of brolucizumab with 2 mg of aflibercept; HARRIER compared 6 mg of brolucizumab with 2 mg of aflibercept. After a 3-month loading phase, subjects in the brolucizumab arms were treated every 12 weeks with an option to adjust to an every-8-weeks interval based disease activity assessments by masked investigators at protocol-defined visits. Aflibercept was given bi-monthly according to labeling at the time of study initiation.

The studies met the primary endpoint of non-inferiority in mean change in BCVA at week 48, brolucizumab versus aflibercept. Visual gains were maintained at year two, with mean change in BCVA of 5.9 letters for brolucizumab 6 mg versus 5.3 letters for aflibercept in HAWK, and 6.1 letters versus 6.6 letters, respectively, in HARRIER.

The results also demonstrated that brolucizumab has the potential to reduce injection burden: of the subjects in the brolucizumab 6 mg group who successfully completed year one on a 12-week dosing interval, 82% in HAWK and 75% in HARRIER were maintained on a 12-week dosing interval in year two.

The year-two results also confirmed brolucizumab's efficacy in reducing retinal fluid. For intra-retinal and/or sub-retinal fluid, the rates were 24% for brolucizumab 6 mg vs. 37% for aflibercept in HAWK ( $P=0.0001$ ) and 24% vs. 39%, respectively, in HARRIER ( $P<0.0001$ ). For central subfield thickness, absolute reductions from baseline were 175  $\mu\text{m}$  for brolucizumab 6 mg versus 149  $\mu\text{m}$  for aflibercept in HAWK ( $P=0.0057$ ) and 198  $\mu\text{m}$  versus 155  $\mu\text{m}$ , respectively, in HARRIER ( $P<0.0001$ ). For subretinal pigment epithelium fluid, the rates were 11% for brolucizumab 6 mg and 15% for aflibercept in HAWK, and 17% vs. 22%, respectively, in HARRIER. No new safety events were identified in year two, and, as in year one, brolucizumab was comparable to aflibercept with the overall incidence of adverse events.

The two-year results show that treatment with brolucizumab can improve visual gains and retinal fluid reduction on a quarterly dosing schedule.

In April 2019, Novartis announced that the US Food and Drug Administration (FDA) had accepted the company's Biologics License Application (BLA) for brolucizumab for treatment of nAMD. Novartis used a priority review voucher to expedite FDA review. If the FDA approves the treatment, Novartis anticipates launching brolucizumab by the end of 2019.





ABSTRACTS OF INVITED LECTURES

Treating Blindness at the Nanoscale: Nanotechnologies as Treatments for Retinal Blindness

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Nanotechnology involves creation and use of materials and devices at the size scale of intracellular structures and molecules and involves systems and structures on the order of <100 nm. Three such technologies are optogenetics, photoswitches, and quantum dots. All three technologies can be administered by minimally invasive procedures and have the possibility of stimulating millions of retinal neurons, in contrast to the electrical retinal prosthesis, which requires major surgery and stimulates an order of magnitude fewer neurons. Optogenetics involves virus-induced expression of light-activated molecules linked to ion channels in neurons, which allows the neurons to generate an electro-chemical signal when exposed to light. Optogenetic moieties can be delivered by intravitreal or subretinal injection. Two human clinical trials are in progress using this technology to transfect retinal ganglion cells. Photoswitches are photochromic ligands that undergo light-induced isomerization, which alters their binding to native ion channels in retinal neurons. Photoswitches can be delivered by intravitreal injection and have reversible effects, which creates the possibility for dose optimization on an individual patient basis. Quantum dots are nanoscale semiconductors that can generate an electric current or a dipole when illuminated by light of the proper wavelength, which in turn can activate voltage-gated ion channels in neurons and initiate electrochemical signaling. Quantum dots can be administered by intravitreal injection, have reversible effects, and in principle can be dosed per patient. Strengths and limitations of these approaches will be discussed.



ABSTRACTS OF INVITED LECTURES

Hyperspectral Autofluorescence (AF) Imaging for Early Detection of Age-related Macular Degeneration (AMD)

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**Purpose:** Soft drusen and basal linear deposit (BLinD) are the lipid rich material of the Oil Spill on Bruch's membrane (BrM) of early AMD. Drusen are focal and recognizable clinically. BLinD is thin, diffuse, and invisible clinically, even on high resolution optical coherence tomography (OCT). Hyperspectral AF Imaging of retinal pigment epithelium/Bruch's membrane (RPE)/BrM flatmounts from AMD donors has led to the discovery of a unique AF emission signature from drusen and BLinD. Our purpose is to translate this discovery into the optimal design of a proposed clinical hyperspectral AF camera for early detection of AMD.

**Methods:** Hyperspectral AF Imaging in our lab consists of excitation of donor tissue with several wavelengths and recovery of the AF emissions in 30 channels (hyperspectral) from 420 to 720 nm. Recovery of individual emission signatures such as for lipofuscin (LF) and drusen is accomplished by non-negative tensor factorization (NTF), an extension of the engineering algorithm non-negative matrix factorization for recovery of components from complex datasets. NTF results are essentially unique and robust to spectral initializations, up to rotations and scale factors, and also deliver the excitation spectra for the fluorophore sources of the recovered emissions, that is, the most efficient wavelengths among those tested for excitation of given fluorophores, exactly what is needed for clinical application. We tested 4 excitation wavelengths (436, 450, 480 and 505 nm) on 20 RPE/BrM tissues with drusen, yielding 4 hyperspectral datasets per tissue that were simultaneously decomposed with NTF.

**Results:** An emission spectrum for drusen and BLinD, the SDr spectrum, was consistently recovered with peak at 520 nm. The total recovered LF spectrum was also consistent, peaking at about 570 nm, with secondary peaks or shoulders at 600 and 650 nm. SDr localized to drusen and subRPE deposits, the LF spectrum to the LF compartment in the RPE with histopathologic sensitivity and specificity.

Remarkably, the excitation spectra for both SDr and LF peaked at 450 nm in all 20 samples. Thus, 450 nm not only optimally excited SDr, it was also more efficient than the classic 480 nm for exciting lipofuscin AF. Dual excitations at ~450 and ~480 nm were the most efficient and reliable pair for detection of early AMD lesions.

**Conclusions:** Dual wavelength autofluorescence excitation with 450 nm and classic 488 nm wavelengths, multichannel hyperspectral AF emission detection, and advanced image analysis are an optimal configuration for clinical detection and quantification of drusen and BLinD in early AMD.



ABSTRACTS OF INVITED LECTURES

Nonperfusion Assessment in Retinal Vein Occlusion : comparison between ultrawide-field fluorescein angiography and large-field OCT-angiography

Agnès Glacet-Bernard, Badreddine Houmane, Julien Tilleul, Fatima Ouahab, Céline Delacour, Eric Souied

**Objective:** To compare large-field optical coherence tomography - angiography (OCTA) in the assessment of the non-perfusion of retinal vein occlusion (RVO) to ultrawide-field fluorescein angiography (UWFA).

**Methods:** Retrospective study of RVO patients examined using both large-field OCTA (Zeiss, Plexelite) with 5 x 12mm x 12mm panoramic image and ultrawide-field fluorescein angiography (Optos 200 °). Vascular density was measured on OCTA and nonperfusion index was calculated on UWFA. Other data were also recorded: age, associated risk factors, time from the RVO onset, best-corrected visual acuity, macular thickness.

**Results:** Forty-three patients with RVO were selected, including central RVO (59%), hemicentral RVO (13%) and branch RVO (28%). The mean age was 65 (range, 34 to 85 years). Two BRVO patients had posterior neovascularization including one eye with intravitreal hemorrhage; ischemic index was respectively 22% and 28% in those eyes. On the central 12mm square OCTA (on the 5x12mm panoramic montage), 55% (20%) of the eyes had globally preserved capillary bed perfusion with rare dropout of the capillary meshwork (stage1). Small areas of nonperfusion smaller than 3 disc areas (stage 2) were found in 19% (19%) of cases, areas of nonperfusion larger than 3 disc areas (stage 3) were found in 15% (17%) of cases and extensive and confluent areas of nonperfusion (stage 4) were observed in 11% (23%) of cases. Thus, the panoramic montage using OCTA allowed the detection of larger nonperfusion areas than using the 12mm square OCTA in 20 eyes (47%). Conversely, when the capillary bed was preserved or only rarefied, perfusion of the peripheral retina also seems to be preserved on UWFA, but there might be nonperfusion of the extreme retinal periphery. OCTA also helped to better analyze retinal perfusion at the initial phase of RVO, when diffuse retinal hemorrhages and dye leakage make the interpretation of fluorescein angiography questionable.

**Conclusion:** OCTA is a non-invasive tool that can now explore the mid-periphery of the retina. It can thus alert to the development of peripheral retinal nonperfusion which may lead to perform fluorescein angiography.



ABSTRACTS OF INVITED LECTURES

Predictors of recurrence in patients with retinochoroidal toxoplasmosis

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**PURPOSE:** Recurrence of toxoplasmic retinochoroiditis may be a sight-threatening complication and needs to be better understand. Host factors are important to consider. We have retrospectively investigated clinical and biological factors influencing recurrences of severe toxoplasmic retinochoroiditis (TRC) confirmed by aqueous humor analysis.

**METHODS:** Analysis of 87 subjects with severe TRC, proven by positive Goldmann-Witmer coefficient (GWC), Toxoplasma gondii (T. gondii) immunoblot, or T. gondii-specific polymerase chain reaction (PCR) in aqueous humor. Cases with immunosuppression or retinal scars without previous recorded episode were excluded. Time-dependent, clinical, treatment-related, and biological factors were explored by univariate and multivariate shared frailty survival analyses.

**RESULTS:** Among 44 included subjects (age,  $404 \pm 17.6$  years; follow-up,  $8.3 \pm 2.7$  years), 22 presented recurrences. There was 0.11 recurrence/patient/year and mean disease-free interval was  $5.0 \pm 2.9$  years. The risk of recurrence was higher immediately after an episode ( $P < 0.0001$ ). Among recurrent cases, the risk of multiple recurrences was higher when the first recurrence occurred after longer disease-free intervals ( $P = 0.046$ ). In univariate analysis, the recurrence risk declined with higher number of intense bands on aqueous T. gondii immunoblot ( $P = 0.006$ ), and increased when venous vasculitis was present initially ( $P = 0.019$ ). Multivariate analysis confirmed that eyes with more intense bands on immunoblot had fewer recurrences ( $P = 0.041$ ). There was a near-significant risk elevation after pyrimethamine/azithromycin treatment ( $P = 0.078$  and  $P = 0.054$ , univariate and multivariate). Intravenous corticosteroid administration, oral corticosteroid administration, aqueous GWC, and T. gondii PCR did not influence recurrences ( $P = 0.12$ ,  $P = 0.10$ ,  $P = 0.39$ , and  $P = 0.96$ , respectively).

**CONCLUSIONS:** Recurrences of severe TRC are not random and may be influenced by clinical and biological factors possibly related to blood-retinal barrier alterations. These results may contribute to identifying biomarkers for TRC reactivation and propose antiparasitic prophylaxis to selected patients.



## ABSTRACTS OF INVITED LECTURES

### OCT-based Classification of Myopic Maculopathy

Kyoko Ohno-Matsui

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**PURPOSE:** To analyze the choroidal thickness (CT) of each type of myopic maculopathy, and to establish an OCT-based classification of myopic maculopathy.

**METHODS:** Participants were highly myopic (HM) eyes that were examined by swept-source OCT at Tokyo High Myopia Clinic. The CT was measured at the subfovea and at 3 mm nasal, temporal, superior, and inferior to the fovea. Myopic maculopathy was classified as tessellation, diffuse atrophy, patchy atrophy, and macular atrophy (MA) based on the fundus photographs. Diffuse atrophy was subdivided into peripapillary diffuse choroidal atrophy (PDCA) or macular diffuse choroidal atrophy (MDCA).

**RESULTS:** We studied 1487 eyes of 884 patients (mean age: 58 years; mean axial length [AxL]: 29.9 mm). Subfoveal CT decreased with an increase in the severity of the myopic maculopathy. The mean subfoveal CT in HM eyes with normal fundus was 274.5  $\mu\text{m}$ , with tessellation was 129.1  $\mu\text{m}$ , with PDCA was 84.6  $\mu\text{m}$ , with MDCA was 50.2  $\mu\text{m}$ , with patchy atrophy was 48.6  $\mu\text{m}$ , with choroidal neovascularization-related MA was 27.3  $\mu\text{m}$ , and with patchy atrophy-related MA was 3.5  $\mu\text{m}$ . Using receiver operating characteristic curves, the optimal CT to predict the presence of PDCA was 56.5  $\mu\text{m}$  nasally, and the CT to predict the presence of MDCA was 62  $\mu\text{m}$  subfoveally. The subfoveal CT was not significantly different in eyes with MDCA and patchy atrophy. A decrease of the subfoveal CT was associated with an older age ( $P < 0.001$ ), longer AxL ( $P < 0.001$ ), presence of myopic maculopathy ( $P < 0.001$ ), and presence of CNV ( $P = 0.002$ ). A decrease of best-corrected visual acuity was not significantly associated with the subfoveal CT.

**CONCLUSIONS:** Progressive and continuous choroidal thinning plays a key role in the progression from no maculopathy to tessellation and to diffuse atrophy. The cut-off value of CT can be used for diagnosing PDCA and MDCA. For progression from MDCA to patchy atrophy, factors other than further choroidal thinning such as Bruch membrane defect may be involved. The subfoveal CT was not a predictor of visual acuity in HM eyes without CNV.



ABSTRACTS OF INVITED LECTURES

Real life study in Uveitis treated with DEXamethasone implant

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**Aims:** In June 2011, intravitreal dexamethasone implants (DEX-I) (Ozurdex®) received European marketing approval for the treatment of posterior, non-infectious uveitis. This study evaluated real-life efficacy and safety in uveitis.

**Methods:** This retrospective observational multicentric study included 152 eyes treated with 358 DEX-I from July 2011 to October 2016. The main outcome measures were change in best-corrected visual acuity (BCVA), central macular thickness (CMT) and vitreous haze score.

**Results:** DEX-I was indicated for macular edema (ME) (51.3%), vitritis associated with ME (40.1%), vitritis (5.3%) and other causes (3.3%). The mean duration of follow up was 19.0 months (10-54 months). An improvement in BCVA of more than 15 letters was found in 35.2% of cases, and more than 5 letters in 64.5% of cases. The average final central macular thickness (CMT) was 350 µm (-80 µm) and vitritis regression (vitreous haze = 0+) was obtained in 81.4% of cases. Ocular hypertension (OHT) (IOP ≥ 25 mmHg and/or gain ≥ +10 mmHg versus baseline) occurred in 28.3% of patients. Topical treatment alone was sufficient for 77% of patients. No filtering surgery was performed. 40.2% of phakic subjects underwent cataract surgery, on average at 11.2 months.

**Conclusion:** The present observational real-life study of DEX-I in uveitis confirms interventional anatomical and functional efficacy outcomes. OHT is infrequent and easily manageable.



ABSTRACTS OF INVITED LECTURES

Retinal complications of myopia: a cross-sectional study

Nicolas Leveziel

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High myopia is a frequent cause of chorioretinal complications. We aimed to evaluate the prevalence of macular complications in patients with myopia.

Methods: A cross-sectional multicenter study carried out in French eye clinics. Macular complications related to myopia included lacquer cracks, myopic choroidal neovascularization, chorioretinal atrophy and retinoschisis. Exclusion criteria included any missing demographic or refractive data related and any history of cataract or refractive surgery.

Results: Data files from 198,641 myopic individuals with a mean age of 34 years (SD: 15 years) were analyzed. Prevalence of macular complications in the high and very high myopia groups was 0.5 % and 4.27 %. At 60 years old or over, the prevalences of blindness or vision impairment were respectively 9.75% and 25.71% in the high and very high myopia groups.

Conclusions: This study provides new data in terms of epidemiology of macular complications related to myopia.





ABSTRACTS OF INVITED LECTURES

Vitreoschisis and diabetic vitrectomy

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*Clinique Rachidi, Morocco*

The posterior cortical vitreous is the home of important modifications during the complicated proliferative diabetic retinopathy. The development of the neovascularisation within the posterior cortex leads to a contraction and partial and abnormal posterior vitreal detachment. The importance and length of the traction determines the site of the separation. Therefore we can have tractional retinal detachment, tractional retinoschisis or vitréoschisis.

The vitréoschisis is the clivage of the posterior hyaloide in two layers. One layer detaches and the other remains attached to the retina. Searching for this second layer allows us to be in the surgical plan and dissect the fibrovascular proliferation. This is even more important in the particularly serious features with large and sticky proliferation.



### The outcome of failed pneumatic retinopexy cases

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Pneumatic retinopexy (PR) was introduced in the 1980's as an optional treatment for rhegmatogenous retinal detachment (RRD), with accepted guidelines for appropriate case selection, including RRD with one or more retinal breaks within 1 clock-hour, breaks in the upper two-thirds of the retina, and sufficiently clear media to rule out the presence of other retinal breaks. Overall reported success rates of PR vary between 45% and 90%, with an average of 70%. While all vitreoretinal procedures fail in some cases, the success rate of scleral buckle and vitrectomy (PPV) is about 85-95%, significantly higher than PR. But - PR is a short, inexpensive and atraumatic procedure, much easier for the patient, and can save the patient from major eye surgery. Many vitreoretinal surgeons are reluctant to perform PR, particularly because of concern for the outcome of the failures. So the real question is whether failure of PR is associated with worse final prognosis compared with failures of other vitreoretinal procedures?

We performed a retrospective study in two major hospitals, and included 114 eyes of 114 patients who underwent PR for RRD and failed, and required subsequent retinal reattachment surgery. In 80% of the eyes the retina was reattached with one additional procedure. The final anatomic and VA results in these cases are comparable with those achieved with primary success. In 20% of the failed PR eyes more than one additional reattachment surgery was required. In these eyes the final outcomes were worse. However, as PR failure occurs in about 30% of properly selected cases, and of these about 80% achieve reattachment and good VA with one additional operations, it is evident that just about 5-6% of eyes that undergo PR have poor outcomes, not different from the results of PPV or scleral buckling. It is our opinion that pneumatic retinopexy should be considered a safe choice for the appropriately selected cases, and the majority of its failures will achieve full reattachment and good visual acuity.



# ABSTRACTS OF ORAL PRESENTATIONS



ABSTRACTS OF ORAL PRESENTATIONS

Dimple in the serous pigment epithelial detachment secondary to neovascular age-related macular degeneration

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**OBJECTIVE:**To describe the dimple, a previously unreported structural optical coherence tomography (OCT) finding in serous pigment epithelial detachment (PED) secondary to neovascular age-related macular degeneration (AMD).  
**MATERIAL-METHODS:**Design: Retrospective case series.

**METHODS:** Clinical charts and multimodal imaging including OCT (structural and angiography) and invasive angiography (fluorescein and indocyanine green) examination of patients with dimple – defined as a localized invagination of the serous PED – were analyzed in 2 high-volume referral centers.

**RESULTS:**Twenty-one eyes of 20 patients (age 74.5 years  $\pm$  8.36) were included. Twelve patients had been previous treated with intravitreal anti-vascular endothelial growth factor, while 8 were “naïve” patients. OCT analysis allowed the definition of 2 phenotypes of dimple: type 1 or (“top denting”) (10 eyes/10 patients) characterized by a vertical dimple associated with a hyper-reflective holding sub-retinal pigment epithelium (RPE) membrane encompassing the posterior face of the RPE and reaching the Bruch's membrane and type 2 (or “side denting”) (11 eyes/10 patients), characterized by a lateral dimple associated with hyper-reflective holding sub-RPE membranes. In the latter phenotype, a wedge-shaped retinal cavitation and weakened RPE were observed in 4 eyes (4 patients). Hyper-reflective holding membranes are not correlated with angiographic signs of neovascularized issue in all cases.  
**CONCLUSIONS:**We described the characteristics of the dimple and its association with hyper-reflective holding sub-RPE membrane (s) in the context of large serous PED secondary to neovascular AMD.

**Keywords:** AMD, imaging



ABSTRACTS OF ORAL PRESENTATIONS

Color fundus imaging of fibrotic scars in exudative age related macular degeneration. A comparison between Multicolor vs Color Fundus Photography vs Optos

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**OBJECTIVE:**To compare the morphological characteristics of subretinal fibrosis in late AMD using Multicolor (MC) imaging, Color Fundus Photography (CFP) and Widefield Color Fundus Photography (WFCP). **MATERIAL-METHODS:**A prospective observational case series. 32 eyes of 31 patients diagnosed with subretinal fibrosis complicating exudative AMD were imaged by MC (Spectralis, Heidelberg Engineering, Heidelberg, Germany), CFP (Canon CR-2 Plus AF Retinal Camera) and WFCP (Optos California, Marlborough, MA, USA) imaging on the same day. A total of three images per eye were analyzed. The overall ability to detect fibrosis (visibility), margins and distinctiveness of fibrosis from surrounding atrophy (when present) were graded using a score (0: not visible, 1: barely visible, 2: mostly visible, 3: totally visible) by two masked readers. Scaling, lesion colocalization on all three imaging techniques and area measurements were performed using ImageJ. **RESULTS:**96 images of 32 eyes were graded for comparison. The average area of the fibrosis was 14,590 mm<sup>2</sup> for MC, 13,839 mm<sup>2</sup> for CFP and 13,768 mm<sup>2</sup> for WFCP. Regarding the overall visibility, fibrosis was totally visible (score 3) in 87.5% of cases using MC and 50% using CFP and WFCP. Margins of the fibrotic lesion were sharply defined (score 3) in 40.6% of eyes with MC, 15.6% and 94% with CFP and WFCP, respectively. When atrophy was associated to fibrosis, MC provided superior distinction between these two lesions (100% for MC versus 134% for CFP and 33.3% for WFCP). The agreement between readers was high for all measurements (P < 0.0001). **CONCLUSIONS:**Multicolor technology allows for better detection and analysis of subretinal fibrosis than conventional CFP and WFCP, especially in cases where surrounding atrophy is associated.

**Keywords:** fibrosis, fibrotic scar, nAMD, Multicolor, Optos, color fundus photography



ABSTRACTS OF ORAL PRESENTATIONS

Subretinal Pigment Epithelium fibrotic tissue response to anti-Vascular Endothelial Growth Factors  
in Age-related Macular Degeneration

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**OBJECTIVE:** To demonstrate and evaluate the qualitative and quantitative response of multilayered fibrovascular pigment epithelial detachment (PED) to anti-vascular endothelium growth factor (VEGF) injections in age-related macular degeneration (AMD).

**MATERIAL-METHODS:** We analyzed retrospectively 30 eyes with exudative AMD showing fibrotic multilayered PED, between 2 consecutive visits after one anti-VEGF intravitreal injection. We quantitatively analyzed the different compartments within the fibrotic tissue and their therapeutic response.

**RESULTS:** The mean follow up time interval between the 2 consecutive visits was  $50 \pm 31.72$  days (range 17 - 134 days). We defined 3 OCT zones within the fibrotic tissue: an inhomogenous hypo-reflective space under the RPE (layer 1), a hyper-reflective band beneath layer 1 (layer 2), and a hypo-reflective space between Bruch's membrane and layer 2 (layer 3). The mean height of layer 1 was  $144.86 \pm 46.76\mu\text{m}$  and  $103.50 \pm 41.50\mu\text{m}$  at visit 1 and 2 respectively (mean change of  $-41.36 \pm 24.06\mu\text{m}$ ;  $p < 0.0001$ ). The mean thickness of layer 2 was  $102.93 \pm 44.97\mu\text{m}$  and  $85.06 \pm 35.16\mu\text{m}$  at visit 1 and 2 respectively (a mean change of  $-17.86 \pm 19.50\mu\text{m}$ ;  $p < 0.0001$ ). The mean height of layer 3 (detectable in a total of only 10/30 eyes) was  $34.3 \pm 31.25\mu\text{m}$  and  $6.0 \pm 8.25\mu\text{m}$  at visit 1 and 2 respectively ( $p = 0.0058$ ). The mean height change for layer 1 was statistically significantly higher than the change for layer 2 ( $p < 0.0001$ ). The mean change of layer 3 compared to layer 1 and layer 2 had no statistical difference ( $p = 0.24$  and  $p = 0.44$  respectively). **CONCLUSIONS:** In our analysis, the fibrovascular PED was compartmented into 3 layers with different reflectivities that respond differently to anti VEGF injections. All 3 layers showed good therapeutic response, however layer 2 had a statistically significantly lower response compared to layer 1, supporting the hypothesis of a fibrotic component in layer 2.

**Keywords:** Fibrosis; Subretinal fibrosis; Macular Scar; Age-related macular degeneration; optical coherence tomography.



ABSTRACTS OF ORAL PRESENTATIONS

OCTA-guided navigated laser therapy for choroidal neovascular membranes secondary to age related macular degeneration

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**OBJECTIVE:**To evaluate the accuracy of the navigated laser photocoagulation system (NAVILAS®, OD-OS GmbH, Teltow, Germany) based on optical coherence tomography angiography (OCTA, PlexElite 9000, Carl Zeiss Meditec, Inc., Dublin, USA) for advanced choroidal neovascularization secondary to age-related macular degeneration (AMD). **MATERIAL-METHODS:**Prospective case-series including nine eyes presenting with advanced neovascular AMD. Inclusion criteria consisted in advanced neovascular membranes with persistence of exudative signs, no longer responding to anti-VEGF therapy, best corrected visual acuity (BCVA)  $\leq 20/400$  and stable for at least 12 months. Exclusion criteria included prior PDT or laser treatment for AMD. All patients were treated with Navilas® guided by overlaid OCTA images of visible feeder vessels. All patients underwent a complete ophthalmic examination, including autofluorescence, spectral domain optical coherence tomography, fluorescein angiography, indocyanine green angiography and OCTA at baseline 1, 3 and 6 months after treatment. Rescue anti-VEGF therapy was performed in non-responsive cases. **RESULTS:**Exudative signs were significantly reduced in all eyes treated patients at 1 and 3 months. Eight of 9 eyes (88%) had a complete flow disappearance within neovascular lesion on OCTA at 1 month; the flow rarefaction were seen after each required retreatment at 3 months, persisting at 6 months. Rescue anti-VEGF was required in only one eye at 1 month because of occurrence of a type 2 neovascularization. **CONCLUSIONS:**This preliminary study showed that Navilas® treatment based on OCTA images seems to be accurate and effective in advanced neovascular lesions secondary to AMD. OCTA-guided Navilas photocoagulation may be a valid therapeutic option, when anti-VEGF therapy is no more efficient.

**Keywords:** Navilas, OCT-Angiography, Neovascular AMD, Choroidal neovascularization, Feeder vessels.





ABSTRACTS OF ORAL PRESENTATIONS

Choroidal neovascular area and vessel density comparison between two swept-source optical coherence tomography angiography devices

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**OBJECTIVE:** To compare choroidal neovascularization (CNV) area and vessel density (VD) measurements between 2 different swept-source optical coherence tomography angiography (SS-OCTA) devices. **MATERIAL-METHODS:** En face OCTA images of patients affected by neovascular AMD were collected prospectively from two devices: Zeiss PLEXElite and Topcon Triton SS-OCT. CNV area and VD of images were measured and analyzed with ImageJ software by two readers to evaluate the agreement between two devices, with respect to different image size (3x3 and 6x6mm) and different image segmentation (automatic vs manual), and a Topcon equivalent Zeiss segmentation as control. **RESULTS:** A total of 30 eyes were analyzed. There was an excellent agreement between the two readers in CNV area measurements intraclass correlation coefficient (ICC) >0.9 in all analyses. We found excellent agreement in CNV area measurements (manual and automatic segmentations) when comparing 3x3mm or 6x6mm images both for each single device and between the 2 devices (overall ICC>0.9). VD measurements between manual to automatic segmentation within the same device and same image size had a high ICC value, but there was a poor agreement in VD between different image sizes in the same device, and also comparing the two devices. There was a poor agreement between the Topcon equivalent Zeiss segmentation and all other segmentations. **CONCLUSIONS:** There was an excellent agreement in CNV area measurements for both SS-OCTA devices in automatic and manual segmentations. Topcon equivalent Zeiss segmentation was not comparable to any of the preset segmentations of Topcon and Zeiss devices. There was a poor agreement in CNV VD between different image size and different devices. For accurate longitudinal analysis of VD it is better to use the same device for each individual, even if both devices can be used interchangeably for CNV area measurements using automatic or manual segmentations.

**Keywords:** Age-related macular degeneration, CNV area and vessel density comparison, comparison between OCTA devices, optical coherence tomography angiography.



ABSTRACTS OF ORAL PRESENTATIONS

Quantitative deep capillary plexus analysis in optical coherence tomography angiography:  
quiescent neovascularization versus intermediate and neovascular AMD

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**OBJECTIVE:**To investigate alterations in deep retinal capillary plexus (DCP) in patients with treatment-naïve quiescent macular neovascularization (qMNV) in age-related macular degeneration (AMD) by means of OCT angiography (OCTA).  
**MATERIAL-METHODS:**Patients presenting with qMNV, followed up for at least 6 months in the Department of Ophthalmology, Centre Hospitalier Intercommunal de Crèteil, were retrospectively included in this cross-sectional study. 3x3 mm OCTA (AngioVue RTVue XR Avanti) vascular density (VD), skeletal density (SkD) and fractal dimension (FD) in QMNV eyes were compared to two control groups presenting with intermediate AMD (iAMD) and neovascular AMD (nAMD). Intragroup and intergroup comparisons were performed at baseline and follow up.  
**RESULTS:**A total of 40 eyes of 39 patients were enrolled in this study: 14/40 eyes with qMNV, 13/40 with iAMD and 13/40 with nAMD. There was no statistically significant difference in terms of VD, SkD and FD between the qMNV group and the iAMD group ( $p=XX$ ). Similarly, no statistically significant difference was found in VD, SkD and FD between the qMNV group and the nAMD group ( $p=XX$ ). VD, SkD and FD remained stable during follow up in the qMNV group.  
**CONCLUSIONS:**Alterations of the DCP have been revealed in OCTA in eyes. However, no statistically significant difference in time or between groups has been shown in the present analysis, suggesting the lack of repercussions of neovascular activity -or lack thereof- on the quantitative biomarkers of the DCP.  
**Keywords:** quiescent neovascularization; intermediate AMD; neovascular AMD; optical coherence tomography angiography; deep capillary plexus; quantitative analysis



ABSTRACTS OF ORAL PRESENTATIONS

Follow up of macular neovascularization using octa: prn versus treat&extend

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**OBJECTIVE:** To compare on optical coherence tomography angiography (OCTA) images the long-term quantitative follow up of choroidal neovascularization (CNV) after anti-vascular endothelial growth factor (anti-VEGF) therapy in eyes with age-related macular degeneration (AMD) undergoing pro re nata (PRN) or treat and extend (T&E) treatment regimens. **MATERIAL-METHODS:** Consecutive patients with neovascular AMD underwent multimodal imaging, including OCTA (AngioPlex, CIRRUS HD-OCT model 5000; Carl Zeiss Meditec, Inc., Dublin, OH) at baseline and at each follow-up visits. Previously treated AMD patients undergoing PRN regimen were included in group A, while treated patients undergoing T&E regimen were included in group B. Quantitative OCTA analysis were performed on outer retina to choriocapillaris (ORCC) slab. CNV total area and vascular density (VD) were measured within the two groups using a free image analysis software (ImageJ, open-source imaging processing software, 2.0.0). **RESULTS:** Thirty eyes of 30 patients were enrolled in our study (mean age  $78.32 \pm 6.8$  years): 15 eyes undergoing PRN treatment regimen in group A and 15 eyes undergoing T&E regimen in group B. Mean follow up was  $24.39 \pm 3.82$  months for Group A and  $21.47 \pm 4.51$  months for Group B. There was no statistically significant difference between the two groups in terms of baseline and last follow up best corrected visual acuity. The area increased by 27% in the PRN cohort ( $p=0.193$ ), while in the T&E cohort area only increased by 7% at 12 months follow up ( $p=0.43$ ).

Similarly, there was a slight increase in VD in the PRN cohort (2%,  $p=0.32$ ), while in the T&E cohort a statistically significant decrease of VD at last follow up was noted (-3.63%,  $p=0.049$ ).

**CONCLUSIONS:** Eyes with CNV secondary to neovascular AMD under anti VEGF therapy undergoing a T&E treatment regimens showed a lower VD than the ones undergoing a PRN treatment regimen after one year of follow-up.

**Keywords:** OCTA, MLA, PRN, Treat and extend, CNV



ABSTRACTS OF ORAL PRESENTATIONS

Impact of Intravitreal Aflibercept Dosing Regimens in Treatment-Naïve Patients with Neovascular Age-Related Macular Degeneration: 2-Year Interim Results of RAINBOW

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**OBJECTIVE:**To collect real-world data on patients with neovascular age-related macular degeneration (nAMD) treated with intravitreal aflibercept injection (IVT-AFL).

**MATERIAL-METHODS:**RAINBOW (NCT02279537) is an ongoing observational, retrospective and prospective, 4-year study to monitor effectiveness and safety of IVT-AFL in patients with nAMD in French clinical practice. Patients with nAMD and treated with IVT-AFL were eligible. The regimens of interest were: regular cohort (patients received 3 initial monthly IVT-AFLs [-1/+2 weeks] followed by regular injections every 2 months [-3/+4 weeks] and  $\geq 6$  injections during the first 12 months) and two irregular cohorts, with and without 3 initial monthly injections (patients received IVT-AFL every <2 or >2 months with or without 3 initial monthly injections). Primary endpoint was change in best-corrected visual acuity (BCVA) from baseline to Month 12. Interim 24-month results according to IVT-AFL treatment regimen are presented here.

**RESULTS:**The mean change from baseline in BCVA (Early Treatment Diabetic Retinopathy letters) was +2.5 (all cohorts), +4.0 (regular cohort), and +4.0 (irregular cohort with 3 initial monthly injections) at 24 months (all groups  $P < 0.05$  vs baseline), and -4.1 (irregular cohort without 3 initial monthly injections) at 24 months. The mean number of IVT-AFLs was 10.7 (regular cohort;  $n=102$ ), 9.3 (irregular cohort with 3 initial monthly injections;  $n=265$ ), and 7.8 (irregular cohort without 3 initial monthly injections;  $n=61$ ). For each cohort, this was a decrease from the change in BCVA achieved at 12 months. The proportion of patients achieving  $\geq 70$  letters was 46.3% (all cohorts). Ocular and non-ocular treatment-emergent adverse events (AEs) were reported in 17.1% and 19.4% of patients, respectively. The most common ocular AEs were lack of response (2.7%), vitreous floaters (2.0%), lacrimation increased (1.4%), and eye pain (1.2%).

**CONCLUSIONS:**Interim results from RAINBOW highlight the importance of 3 initial monthly IVT-AFLs on visual outcomes at 24 months in patients with nAMD.

**Keywords:** AMD, neovascular age-related macular degeneration, aflibercept, anti-VEGF, observational



ABSTRACTS OF ORAL PRESENTATIONS

Comparison of modules on a mobile medical app with standard tests for remote monitoring of visual parameters

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**OBJECTIVE:** Patients with ocular disease could benefit from remote monitoring of their vision. This study evaluated the agreement between standard clinical tools and a mobile medical app including three medical modules to evaluate visual acuity, contrast sensitivity and detection of metamorphopsia and scotoma, respectively. **MATERIAL-METHODS:** open-label, single arm, prospective, single center study on 120 eyes to assess the medical relevance and accuracy of the results obtained by the three modules of the app. **RESULTS:** 78 subjects, 120 eyes were included based on a visual acuity between 1.0 and 0.0 logMAR. Agreement between the near visual acuity (NVA) module and Sloan ETDRS chart and between NVA module and ETDRS chart was as follows: Bland-Atman (B&A) analysis revealed a very low level of bias (0.53 letters (SD: 5.25 letters) and -1.53 letters (SD: 6.96 letters) and 95% limits of agreement of -9.75 to 10.82 letters and -15.16 to 12.11 letters, respectively. In addition, the correlation coefficients were 0,91 and 0,86, respectively. The agreement between CS module and Pelli-Robson was as follows: B&A mean difference -0.16 logCS and 95% limits of agreement of -0.54 to 0.22 logCS; correlation coefficient =0.73. Results from the mobile app module were reproducible compared to the paper Amsler grid (McNemar test p-value=1). **CONCLUSIONS:** DISCUSSION: Concordance between the modules on a mobile medical app and the standard tests for both NVA and Amsler grid was good. However, agreement between the mobile app module and the standard test for contrast sensitivity was low. It would be interesting to evaluate, over time, the variability in results utilizing the mobile medical app as well as concordance between the mobile medical app and the standards tests. **CONCLUSION:** NVA and Amsler grid modules on a mobile medical app could be used for remote monitoring of vision. **Keywords:** remote monitoring, mobile app, visual acuity, mHealth, visual acuity monitoring, AMD



## ABSTRACTS OF ORAL PRESENTATIONS

### Setting up a nurse-led Optical Coherence Tomography (OCT) clinic: Structure and role of the clinic

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**OBJECTIVE:**The objective of the study is to breakdown the structure and role of a nurse-led OCT clinic and to determine the clinical characteristic and diagnoses of patients attending this clinic as a reference for other departments to set up a similar clinic.

**MATERIAL-METHODS:**A retrospective study was conducted by choosing 45 patients from Borders General Hospital nurse-led OCT clinic at random and their discharge letters were analysed for their demographics, diagnosis, follow up duration and if they were reviewed by a consultant at any point. The structure of the OCT clinic was also documented. **RESULTS:**Data from 45 patients showed that 62.2% of the patients who attend the clinic have a diagnosis of Age-related macular degeneration (AMD). 13.3% of the patients have diabetic macular oedema and 13.3% of them were diagnosed with vein occlusions. Diagnoses like scar, haemorrhage and swelling account for 11% of patients attending this clinic. 40% of the patients will get a follow up appointment in between 8 to 12 weeks. 26.7% will require follow up of 6 weeks or earlier and 26.7% will be seen in between 6 to 8 weeks. Only 44% of patients do not need further follow up. 66.7% of patients has been reviewed by a consultant at one point.

Structure of the nurse led clinic was also illustrated.

**CONCLUSIONS:**Nurse-led OCT clinic is a very valuable service and has a role in improving patient care and patient flow especially in managing AMD patients. All of the patients in this clinic pathway require OCT follow up but not every patient need a consultant review. Furthermore, this group of patients will require huge amount of resources as only 44% of patients have no further follow up. Setting up this clinic would enable Ophthalmology departments to reallocate consultant resources especially in hospitals with no middle grade doctors.

**Keywords:** nurse-led OCT clinic, age-related macular degeneration, structure of nurse-led clinic, setting up nurse-led clinic, OCT follow up



ABSTRACTS OF ORAL PRESENTATIONS

Optical coherence tomography angiography extravascular signal in diabetic macular edema

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**OBJECTIVE:**To analyze the origin and evolution of hyperreflective fluid with extravascular signal (EVAS) detected by Optical Coherence Tomography Angiography (OCTA) in diabetic macular edema (DME).  
**MATERIAL-METHODS:**A retrospective study of all consecutive eyes with DME imaged using OCTA 3x3mm (AngioVue, Optovue, Inc., Freemont, CA) over a 1-year period was conducted in a tertiary care referral center. Demographics data, visual acuity, SD-OCT, fluorescein angiography and OCTA images were reviewed. All DME eyes with EVAS at baseline and at least three months of follow-up and 2 OCTA examinations in a one-year period were included in the longitudinal analysis.  
**RESULTS:**Over 165 eyes with DME imaged using OCTA, 61 eyes (37%) showed hyperreflective fluid with EVAS. In almost of all these eyes (97%, n= 59/61), hyperreflective fluid with EVAS were observed within the foveal avascular zone (FAZ) area. Presence of hyperreflective foci within the EVAS was observed in 85% (52/61) of eyes. In all eyes, EVAS was not corrected by the PAR algorithm and lead to an overestimation of the automatically assessed capillary density. The longitudinal study included 33 eyes from 24 patients, with a mean follow up time of  $14.2 \pm 9.2$  months. Ten eyes were only observed while 23 eyes received anti-VEGF injections during the follow-up. The hyperreflective fluid with EVAS was transient in 85% (28/33) of eyes, with a complete (6/33) or partial (20/33) resolution. Hard exudates appeared in the same area in 36% (12/28) of eyes. No significant differences were observed regarding the evolution of hyperreflective fluid with EVAS in treated eyes compared with observed eyes.  
**CONCLUSIONS:**Hyperreflective fluid with EVAS was detected by OCTA in more than one-third of DME eyes. These hyperreflective content may origin from an acute blood retinal barrier rupture with extravasation of lipids that may deposit as hard exudates but mostly resolved either spontaneously or under anti-VEGF therapy.  
**Keywords:** diabetic macular edema, hyper reflective fluid, extravascular signal, OCT-angiography





ABSTRACTS OF ORAL PRESENTATIONS

Real-World Use of Intravitreal Aflibercept Injections in Diabetic Macular Edema: 1-Year Interim Results of APOLLON

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**OBJECTIVE:** To assess 12-month visual and anatomic outcomes in patients with diabetic macular edema (DME) treated with intravitreal aflibercept injection (IVT-AFL) in clinical practice in France.

**MATERIAL-METHODS:** APOLLON (NCT02924311) is a prospective, observational, 2-year study to monitor visual, anatomic, and safety outcomes following IVT-AFL in treatment-naïve or previously treated patients (any treatment other than IVT-AFL, including laser or steroids). The primary endpoint was mean change in best-corrected visual acuity (BCVA) from baseline to 12 months.

**RESULTS:** A total of 147 patients had both baseline and 12-month data available; of these, 77 were treatment-naïve and 70 were previously treated. Of those previously treated, 44 had prior treatment with ranibizumab and 41 with photocoagulation laser. Baseline demographics were similar between treatment groups. Treatment-naïve patients had a higher BCVA score at baseline (62.7 letters) than previously treated patients (60.0 letters). At 12 months, change in BCVA from baseline was +6.5 letters (total population), +7.8 letters (treatment-naïve), and +5.0 letters (previously treated). Gains of  $\geq 10$  and  $\geq 15$  letters, were achieved in 38% and 24% of patients in the total population, 46% and 30% in the treatment-naïve group, and 32% and 19% in the previously treated group, respectively. The mean number of injections was 7.6 for all groups. The proportion of patients receiving 5 initial IVT-AFLs was 51.9% in the treatment-naïve and 31.4% in the previously treated group. Mean change in central retinal thickness from baseline to 12 months was -130  $\mu\text{m}$  (total population), -121  $\mu\text{m}$  (treatment-naïve), and -141  $\mu\text{m}$  (previously treated). Ocular adverse events were reported in 54.1% of patients, the most common were cataract (44%) and diabetic retinal edema (3.1%).

**CONCLUSIONS:** This 12-month interim analysis of the APOLLON study showed that IVT-AFL was associated with functional and anatomical improvements in both treatment-naïve and previously treated patients with DME in clinical practice in France.

**Keywords:** DME, diabetic, aflibercept, anti-VEGF, observational



## ABSTRACTS OF ORAL PRESENTATIONS

### The eye in space: next step to Mars travel

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**OBJECTIVE:** A future mission to Mars could be critical for vision as suggested by vision impairments occurring in astronauts returning from long-term space travels. To review the different vision impairments that could occur during a journey to Mars.

**MATERIAL-METHODS:** We reviewed the literature on vision impairments in astronauts and have added our on-ground experiment results

**RESULTS:** Distance from earth and isolation of astronauts in a hostile environment should train the crew to diagnose and treat the best-known eye diseases. Diagnostic devices have already been tested in space and the development of artificial intelligence could help astronauts in this task.

Light flashes, especially of blue color, have been reported by astronauts in space, where high energy particles can interact with the human body. Their true nature in such conditions is still not completely understood but our experiment on ground during radiation therapy probably indicates the stimulation of S-cones and retinal ganglion cells that reflects the activation of the afferent visual pathway. The so-called Cherenkov radiation could also occur with electrons and photons. Lastly, the effect of microgravity that induced a fluid shift and ophthalmic changes, best known as VIIP syndrome (visual impairment and intracranial pressure) is the easiest to understand but the most difficult to prevent related to creating an artificial gravity in the spaceship

**CONCLUSIONS:** Isolation, Radiation and Microgravity are the main eye issues to overcome before going to Mars. Improving knowledges during preliminary spaceflights and strengthen spacecraft technology are the best way to resolve these issues

**Keywords:** Space travel; Astronauts; Radiation; Microgravity; Retina; Intracranial hypertension



ABSTRACTS OF ORAL PRESENTATIONS

Pharmacological antagonism of mineralocorticoid receptor exerts VEGF-independent anti-angiogenic effects: Implication for wet AMD

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**OBJECTIVE:**AMD is a low-grade inflammatory disease, but glucocorticoids are not efficient in reducing CNV or its associated macular edema. Hypothesizing that mineralocorticoid receptor (MR) pathway contributes to the disease mechanism, we evaluated MR antagonists in rat experimental CNV and spironolactone add on anti-VEGF in nAMD patient refractory to anti- VEGF.

**MATERIAL-METHODS:**Laser-induced CNV was performed in rats treated with spironolactone (25 mg/kg/day) or with the eplerenone (200 mg/kg/day) for 14 days. A prospective clinical pilot study included 20 nAMD patients with refractory intra- or subretinal fluid despite intensive anti-VEGF regimen. In addition to monthly injections of anti-VEGF during 6 months, they received adjuvant oral spironolactone (25mg week 1, 50mg until Month 3, 25mg until Month 4, 0mg until Month 6). SD-OCT was performed using follow-up mode (CT NCT03744767)

**RESULTS:**Both MR antagonists reduced CNV volume and leakage as efficiently as anti-VEGF in rats. Spironolactone did not reduce VEGF levels but increased the expression of decorin, which showed dose-dependent anti CNV effects. Co administration of spironolactone with siRNA directed at decorin resulted in a loss of efficacy of spironolactone. Long-lasting microspheres releasing spironolactone for at least 2 months efficiently reduced CNV in rats. In eyes from patients with refractory nAMD at M3, there was a statistically significant reduction in central retinal thickness ( $p = 0.011$ ) and volume ( $p = 0.012$ ), in the foveal thickness ( $p = 0.039$ ), the thickest cystic changes ( $p = 0.040$ ), and subretinal fluid ( $p = 0.014$ ). The improvements were lost after stopping spironolactone at Month 4 despite continuous monthly anti-VEGF injections.

**CONCLUSIONS:**MR antagonism prevents CNV through a VEGF-independent mechanism, is additive with anti-VEGF and mediated by up-regulation of decorin. These preclinical and clinical results identify the MR as a novel molecular regulatory target for nAMD.

**Keywords:** AMD, mineralocorticoids, choroidal neovascularization, anti-VEGF



ABSTRACTS OF ORAL PRESENTATIONS

Imaging of RPE cells using near-infrared autofluorescence adaptive optics SLO in healthy eyes and AMD

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**OBJECTIVE:** To observe the RPE cell mosaic in vivo in patients using near infrared autofluorescence (NIRAF) imaging with an adaptive-optics corrected scanning laser ophthalmoscope.

**MATERIAL-METHODS:** We performed NIRAF imaging of RPE cells in vivo in 3 healthy volunteers and 2 patients using a 757 nm excitation source in adaptive optics scanning laser ophthalmoscopy (AOSLO). NIRAF excited at 757 nm and collected in an emission band from 778 to 810 nm.

**RESULTS:** AOSLO produced a robust NIRAF signal, presumably arising from melanin, and revealed the typical hexagonal mosaic of RPE cells at most eccentricities imaged within the macula of normal eyes. Several patterns of altered NIRAF structure were seen in patients, including disruption of the NIRAF over a drusen, diffuse hyper NIRAF signal with loss of individual cell delineation in a case of non-neovascular age-related macular degeneration (AMD), and increased visibility of the RPE mosaic under an area showing loss of photoreceptors. In some participants, a superposed cone mosaic was clearly visible in the fluorescence channel at eccentricities between 2 and 6° from the fovea.

**CONCLUSIONS:** NIRAF imaging at 757 nm offers efficient signal excitation and detection, revealing structural alterations in retinal disease with good contrast and shows promise as a tool for monitoring future therapies at the level of single RPE cells.

**Keywords:** Retinal pigment epithelium, dry age-related macular degeneration, in vivo imaging



ABSTRACTS OF ORAL PRESENTATIONS

Prediction of individual disease conversion in early AMD using artificial intelligence

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**OBJECTIVE:** While millions of individuals show early age-related macular degeneration (AMD) signs, yet have excellent vision, the risk of progression to advanced AMD with legal blindness is highly variable. We suggest means of artificial intelligence to individually predict AMD progression.

**MATERIAL-METHODS:** In eyes with intermediate AMD, progression to the neovascular type with choroidal neovascularization (CNV) or the dry type with geographic atrophy (GA) was diagnosed based on standardized monthly optical coherence tomography (OCT) images by independent graders. We obtained automated volumetric segmentation of outer neurosensory layers and retinal pigment epithelium, drusen, and hyperreflective foci by spectral domain-OCT image analysis. Using imaging, demographic, and genetic input features, we developed and validated a machine learning-based predictive model assessing the risk of conversion to advanced AMD.

**RESULTS:** Of a total of 495 eyes, 159 eyes (32%) had converted to advanced AMD within 2 years, 114 eyes progressed to CNV, and 45 to GA. Our predictive model differentiated converting versus nonconverting eyes with a performance of 0.68 and 0.80 for CNV and GA, respectively. The most critical quantitative features for progression were outer retinal thickness, hyperreflective foci, and drusen area. The features for conversion showed pathognomonic patterns that were distinctly different for the neovascular and the atrophic pathways. Predictive hallmarks for CNV were mostly drusen-centric, while GA markers were associated with neurosensory retina and age.

**CONCLUSIONS:** Artificial intelligence with automated analysis of imaging biomarkers allows personalized prediction of AMD progression. Moreover, pathways of progression may be specific in respect to the neovascular/atrophic type.

**Keywords:** age-related macular degeneration, optical coherence tomography, artificial intelligence, machine learning



ABSTRACTS OF ORAL PRESENTATIONS

FDA-authorized autonomous AI for diabetic retinopathy screening in clinical routine

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**OBJECTIVE:** By 2045 629 patients are estimated to be diagnosed with diabetes. Regular eye examinations are recommended in people with diabetes. An autonomous AI screening device (IDx-DR) for the detection of more than mild diabetic retinopathy (DR), was cleared by the FDA in 2018 for use in people with diabetes without visual complaints. The purpose of this study is to evaluate the use of IDx-DR in clinical routine. **MATERIAL-METHODS:** Included were all available patients with type I/II diabetes, no subjective eye symptoms, no previous DR diagnosis and no confounding eye disease, who visited our Department of Endocrinology for a routine clinical examination. A medical student received a four hour training to independently operate the AI system. The acquired images (four 45° color fundus images macula-/disc-centered) were transferred to the Vienna Reading Center (VRC) and evaluated for DR according to the ICDR severity scale by a certified and masked image grader and a retina specialist. IDx-DR outputs/VRC manual grading were then compared and sensitivity/specificity were calculated. **RESULTS:** Patient representation was mostly comparable to that of the Austrian diabetes population in terms of gender/age. Disease prevalence was 9%. When compared to VRC grading, IDx-DR identified more than mild DR with a sensitivity of 88.2%/specificity of 89.0%. Based on the preliminary analysis of the first 200 cases, where only two patients were diagnosed negative by IDx-DR but positive by VRC, the study will be adequately powered with 1670 subjects. **CONCLUSIONS:** Autonomous AI for DR screening is safe for patients and a useful tool that can be easily applied in clinical routine. While it is not meant to replace the ophthalmologist's examination, the identification of diabetes patients with no/early signs of DR allows a reallocation of resources to cases that require more intensive management. Automated DR screening is reliable/fast/easy/independent of location and could therefore increase the patients' compliance. **Keywords:** diabetic retinopathy, screening, artificial intelligence, machine learning, deep learning, clinical routine



ABSTRACTS OF ORAL PRESENTATIONS

RETINASK? MACULART! An Introduction to the (Human) Intelligence of  
Automated Diagnosis of Macular Disease

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**OBJECTIVE:**To present the latest developments of the Queryable Atlas of the Retina, "RETINASK", in light of the last two decades of progress in diagnostic methods, tools and treatment of macular disease and evolution in computer hardware and algorithmic developments including neural networks. **MATERIAL-METHODS:**The core architecture of the Queryable Atlas of the Retina as presented by Sayegh et al at 2000 AAO has been retained. Additional modules involving OCT imaging, deck image review and automated image recognition have been integrated.

Review of Artificial Intelligence (AI) and Neural Networks (NN) paradigms as originally introduced by our group as well as recent results by the Iowa group, Google and others have been critically analyzed and their advantages and limitations taken into account in designing more robust approaches to automated diagnosis. **RESULTS:**Unlike a number of recent entries in the area of automated diagnostic, RETINASK is capable of explaining its findings in a natural way that is familiar to the expert and novice alike. The extension of the included fields and the availability of assisted automated diagnostic have extended the diagnostic power of the system. Collaborative tools have allowed the rapid expansion and editing of entries and the availability and universality of the system. The system has also shown to be an excellent teaching tool for less experienced ophthalmologists and other users less familiar with the magic of the macula.

**CONCLUSIONS:**The Queryable Atlas of the Retina, RETINASK, plays a unique role amongst applications that support diagnosis of macular disease. It can be used in conjunction with other tools as its continuing development and deployment takes place in a collaborative way. RETINASK is a powerful tool inspired by and positioned to inspire the broader retina and Maculart community.

**Keywords:** Macula Automated Diagnosis Artificial Intelligence Neural Networks



ABSTRACTS OF ORAL PRESENTATIONS

OphtAI – Telescreening Platform for Automatic Evaluation of Diabetic Retinopathy

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**OBJECTIVE:**The OphtAI Artificial Intelligence platform, the industrial version of RetinOpTIC project, performs color fundus images' Diabetic Retinopathy (DR) mass screening, grading and quality assessment. Algorithm performance was evaluated on the Messidor-2 image database.

**MATERIAL-METHODS:**Solution manages tele-diagnosis, allowing for fundus exams transmission to a centralized platform, which first assesses photography quality; then, using convolutional neural networks (CNNs), generates a DR referability detection and an automatic grading.

In e-medicine networks, quality is deemed insufficient for grading in about 10% of images. Such cases' detection, either for re-acquisition of relevant patient images or for prevention of useless readers analysis, is an important step for network performance improvement. In this project's framework, we developed an AI solution for automatic quality assessment. Once the image is correct, a combination of CNNs produces one referral decision. It was jointly trained on more than 700,000 images from a well-established consortium of Paris hospitals, and unlike other AI solutions that are currently available, individual CNNs are complementary with one another. Thanks to a proposed heatmap generation method, patterns detected by each CNN can be overlaid on images for lesions' and pathology visualization.

**RESULTS:**Referable DR detection has an area under the ROC curve of 0.988 on Messidor-2 database, using University of Iowa's reference standard (sensitivity = 99.0%, specificity = 87.0%). This exceeds previously reported systems results evaluated under same conditions. Remarkably, each co-trained CNN specializes in one lesion type or category. Therefore, the system can produce lesion-specific heatmaps, unlike previously reported heatmaps methods.

**CONCLUSIONS:**Proposed solution improves referable DR fully automatic detection and provides automated image quality assessment. Algorithms have been CE marked to provide a computer-aided decision system to be used in hospitals, private practices, and mass screening networks.

**Keywords:** OphtAI, Diabetic Retinopathy screening, Image quality assessment, lesion visualization, Convolutional Neural Networks, Messidor-2





ABSTRACTS OF ORAL PRESENTATIONS

Quantitative Optical Coherence Tomography Angiography biomarkers for neovascular age related macular degeneration treated using a treat-and-extend regimen

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**OBJECTIVE:**To evaluate the association between quantitative OCT-A parameters and clinical outcomes in treatment naïve neovascular age-related macular degeneration (nAMD) followed over twelve-months. **MATERIAL-METHODS:**Observational, prospective study of consecutive patients. The treatment protocol was a loading dose of anti-VEGF intra-vitreous injections (IVI) followed by a treat-and-extend regimen. Eyes were scanned by swept-source, blood flow was identified in outer retina angiograms and delineation performed automatically. Quantitative analysis was issued for blood flow area, vessel density (VD), Fractal Dimension (FD) and Lacunarity (LAC). At baseline all the patients performed two consecutive acquisitions for repeatability analysis. OCTA parameters were evaluated after the loading dose and at twelve months and an association with the number IVI (>/< 7) or with a good functional response (defined as at least 5 ETDRS letters) was studied. A level of significance =0.05 was considered. **RESULTS:**Inclusion of 62 patients at baseline, of whom 42 completed the study protocol. All the parameters had excellent intraclass correlation coefficients (>0.90). The median number of injections at 12 months was 7 (5-12) and 64% of patients had a good functional response. Blood flow area, VD and FD were lower following the loading dose of anti-VEGF ( $p<0.01$ ) and augmented thereafter with no statistical difference to baseline values. Baseline FD was higher in eyes with good functional response at 12 months ( $p=0.02$ ) and lower in eyes that required less IVI ( $< 7$  IVI) ( $p=0.02$ ). Baseline FD achieved the best performance discriminating the number of IVI [AUC = 0.82 (0.70-0.95)] and a good functional outcome [AUC = 0.90 (0.82 - 0.99)]. The variation of OCTA parameters following the loading dose of anti-VEGF didn't augment the discriminative power of the baseline values ( $p>0.05$ ). **CONCLUSIONS:**OCT-A can be used to perform automatic quantitative analyses of CNV. OCT-A may provide useful biomarkers for the follow-up of CNV in age-related macular degeneration.

**Keywords:** neovascular age related macular degeneration; OCTA; imaging biomarkers,



ABSTRACTS OF ORAL PRESENTATIONS

Long-term quantitative analysis of choriocapillaris flow impairment in age-related macular degeneration by means of optical coherence tomography angiography

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**OBJECTIVE:** To investigate and to quantify the long-term progression of choriocapillaris (CC) flow impairment in age-related macular degeneration (AMD) on optical coherence tomography angiography (OCTA) images using an automated method. **MATERIAL-METHODS:** Consecutive patients with intermediate AMD and age-matched, sex-matched healthy controls were included in this study. All patients underwent a 3x3 mm OCTA examination acquired with a 70-kHz, 840-nm-wavelength spectral-domain OCT system (Avanti RTVue-XR, Optovue Inc.) at baseline and last follow up. Quantitative microvascular analysis of the en face flow CC slab was performed and texture features of the CC were extracted, at baseline and last follow up. Main outcome measures included CC quantitative OCTA features: perfusion density (PD), CC flow voids and their progression with time.

**RESULTS:** Ninety eyes of 90 patients (mean age 75.99±8.55 years, 32 male, 58 female; 61 eyes in the intermediate AMD group and 29 eyes in the healthy control group) were included, with a mean follow up of 22.22±10.24 months. At last follow up, 9/61 eyes from the intermediate AMD group at baseline had developed macular neovascularization (MNV): 3 type 1 MNV, 3 type 3 MNV and 3 mixed MNV. The presence of drusen in intermediate AMD group was correlated with CC alterations at baseline and follow up. The mean PD decreased significantly in both groups over time (p=0.011 in intermediate AMD and p=0.045 in the control group). **CONCLUSIONS:** The longitudinal evaluation of CC alterations in intermediate AMD eyes may explain the causal role of the CC in both drusen and MNV development.

**Keywords:** optical coherence tomography angiography; age-related macular degeneration; intermediate AMD; choriocapillaris;



ABSTRACTS OF ORAL PRESENTATIONS

Visual acuity gain profiles and anatomical prognosis factors in patients with drug-naïve diabetic macular edema treated with dexamethasone implant: the NAVEDEX study

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**OBJECTIVE:**To evaluate the visual acuity (VA) gain profiles between patients with naïve diabetic macular edema (DME) treated by DEX-implant, and to assess the baseline anatomical and functional factors that could influence the response to the treatment in real-life conditions.

**MATERIAL-METHODS:**A retrospective, multi-center observational study included 129 consecutive eyes with drug-naïve DME treated by DEX-implant.

**RESULTS:**Mean follow-up was 17 months. Two groups of VA gain trajectories were identified: group A, with 71% of patients whose average VA gain was less than 5L and group B, with 29% of patients with an average gain of 20L. Probability of belonging to group B was significantly higher in patients with low baseline VA, <37L ( $p = 0.001$ ). VA gain outcomes after the first DEX-implant seemed to predict the final VA changes over 2 years. Ellipsoid zone alterations (EZA) or disorganization of retinal inner layers (DRIL) were associated with a lower final VA (53.0L against 66.4L,  $p = 0.002$ ) but without significant difference in VA gain (4.9L against 6.8L ( $p = 0.582$ )).

**CONCLUSIONS:**Two VA gain profiles were identified depending on baseline VA, showing that the lower the baseline VA, the better the VA gain. Regarding anatomical prognosis factors, presence of baseline DRIL or EZA seemed to negatively influence final VA but has no impact on VA gain.

**Keywords:** DEX-implant, Diabetic macular edema, visual acuity gain.



ABSTRACTS OF ORAL PRESENTATIONS

Phenotypic characteristics of rod-cone dystrophy associated with MYO7A mutations in a Large French Cohort

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**OBJECTIVE:**To report the rod-cone dystrophy phenotype of a large French cohort of patients with Usher syndrome type 1 (USH1) associated with MYO7A mutations, aiming to model photoreceptor degeneration over time. **MATERIAL-METHODS:**The patient database from the National Reference Center for Rare Diseases of Quinze-Vingts hospital was queried and patients with USH1 carrying MYO7A mutations were selected for the study. Patients recruited in the cohort underwent clinical examination including personal and family history, best-corrected visual acuity (BCVA), color vision, slit lamp examination, full-field electroretinography (ffERG), kinetic visual fields (VF), retinophotography, spectral domain optical coherence tomography (SD-OCT), near-infrared (NIRAF) and short-wavelength fundus autofluorescence (SWAF) imaging. Data were subsequently analyzed, using IBM SPSS Statistics software v. 21.0. **RESULTS:**Among the large cohort of patients followed at the National Reference Center, Referet, 54 patients (42 families) with USH1 were identified harboring MYO7A pathogenic mutations. Clinically, most patients presented with a typical rod-cone dystrophy phenotype, BCVA and central VF deteriorating linearly. At age 29, they demonstrate an average preservation of the 50 central degrees in binocular VF decreasing by 50% within 5 years. Two cases presented very mild and other two extremely severe fundus findings. Structural changes based on SD-OCT, SWAF and NIRAF measurements did not correlate with age limiting the relevance of these parameters to establish disease progression modelling and prognostic prediction. Patient with MYO7A mutations show higher percentage of ERM and similar CME occurrence than other RCD patients. Various subgroup analysis did not show substantial genotype-phenotype correlation. **CONCLUSIONS:**No clear phenotype-genotype correlation was found in this study. Our study adds further evidence that functional characteristics of this subset of patients follow other typical RCD patients, but structural changes are variable in the course of disease indicating the need for case by case evaluation for visual prognosis prediction and candidates' selection for potential photoreceptor rescue therapies.

**Keywords:** retinal dystrophy, rod-cone dystrophy, retinitis pigmentosa, phenotype-genotype correlation, MYO7A



ABSTRACTS OF ORAL PRESENTATIONS

Design of a randomized, placebo-controlled phase one trial to evaluate the safety, pharmacokinetics and pharmacodynamics of BIO201 developed for the treatment of intermediate AMD and Stargardt Disease

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**OBJECTIVE:**The objectives of the phase I MACA-PK study are to evaluate the safety, tolerability, pharmacokinetics (PK) and pharmacodynamics (PD) of BIO201 developed for the treatment of Intermediate Age-related Macular Degeneration (iAMD) and Stargardt Disease (STGD). We will also evaluate the food effect and the effects of AREDS and AREDS2 formulations on PK and PD of BIO201 and on the potential anti-inflammatory effects of BIO201. **MATERIAL-METHODS:**This is a First-In-Human, Phase I, randomised, double-blind, placebo-controlled, mono-centre study evaluating single (SAD) and multiple ascending oral doses (MAD) of BIO201 in healthy subjects aged 18 years or older. In SAD 16 Subjects will receive BIO201; (Cohorts A1: 50 mg, B1: 100 mg, A2: 300 mg, and B2: 600 mg in fasted condition, A3: 300 mg in fed condition).

During MAD, BIO201 will be administered orally for 10 or 14 days to a total of 40 healthy volunteers in 3 cohorts. In cohorts C and D, 8 volunteers will receive two doses of BIO201 and 2 volunteers; placebo, daily for 10 days, in fed/fasted condition. In Cohort E: 8 subjects will receive AREDS and a dose of BIO201, 8 AREDS2 and a second dose of BIO201, and 2 subjects, placebo and AREDS or AREDS2. BIO201 will be administered daily for 5 days, and AREDS or AREDS2 for 10 days in fed/fasted conditions. As BIO201 may reduce postprandial inflammation, IL-1, IL-6, TNF-alpha, and CRP, will be measured in all Cohorts following a high fat meal on Day-1 and on the last day of BIO201 administration with or without AREDS/AREDS2. **RESULTS:**Enrolments are scheduled to start by the end of 2019. The duration of the trial is expected to be 4 months. Results will be presented as they become available.

**CONCLUSIONS:**The safety, PK and PD profiles of may confirm BIO201 as a new drug for STGD and iAMD.

**Keywords:** BIO201, AMD, Stargardt, Phase I, Design. Food effect.



ABSTRACTS OF ORAL PRESENTATIONS

**Luxturna, the first approved gene therapy for RPE65-related retinal dystrophy: first European experience**

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**OBJECTIVE:** Report the observations and short term results following Luxturna sub retinal injections in the first two patients at the CHNO des Quinze-Vingts

**MATERIAL-METHODS:** Luxturna has been approved at the end of 2017 by the FDA in USA and recently in Europe. Its delivery has been approved by the French health authorities since December 2018, in the frame of a Temporary Authorization of Use (ATU).

The main indication is patient with an inherited retinal disease caused by mutations in both alleles of RPE65 and who have enough remaining retinal cells.

An age criteria was added in the frame of the ATU:  $\leq 20$  years.

Two young sisters of 10 and 8 years of age presenting Leber Congenital Amaurosis (LCA) received the treatment between December 2018 and February 2019.

Best Corrected Visual Acuity (BCVA), Goldman Visual Field (GVF), retinal sensitivity (FST) were assessed before and post bilateral sub retinal Luxturna injections. The assessment included also general ophthalmic examination and retinal imaging (Fundus photography, Fundus Autofluorescence and OCT)

**RESULTS:** No significant adverse event was observed. Subjectively, an improvement of dark adaptation was reported one week after treatment of the first eye. This patient gave up the use of a headlamp that she was requiring for her daily activities. The parents reported a significant improvement of her visual behaviour. Significant improvement of the BCVA, the retinal sensitivity and the dark adaptation in both eyes (Table 1)

**CONCLUSIONS:** These first two patients present probably the best indication for gene therapy. They present a LCA with an advanced low vision since birth and preserved central retinal structure which allowed a significant visual benefit after gene therapy. Long term follow-up and additional data from a larger number of patients will contribute to evaluate treatment indications with more accuracy, the exact benefit and the ideal mode of delivery for this therapeutic innovation.

**Keywords:** Amaurose congénitale de Leber, thérapie génique, Luxturna



ABSTRACTS OF ORAL PRESENTATIONS

Contribution of MRI for the etiological assessment of uveitis: about 402 patients

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**OBJECTIVE:** The objective of this study was to assess the diagnostic value of cerebral MRI depending on the presence of neurological signs.

**MATERIAL-METHODS:** We performed a retrospective study on all patients with uveitis who underwent a cerebral MRI for the etiological diagnostic of uveitis, between 2003 and 2018. MRI was considered useful if it allowed to confirm a diagnosis or to correct a misdiagnosis.

**RESULTS:** Of the 1215 patients with uveitis (57% women, mean age 45 years), 402 (33,1%) underwent a cerebral MRI. Eighty were considered abnormal (19,9%), including aspecific hypersignal (35%), vascular leucopathy (42,5%), inflammatory injury (16,2%) and cerebral lymphoma (4,8%).

Etiologic diagnosis among all MRI was as follows: 46% idiopathic uveitis, 25% systemic disease, 18,4% pure ophthalmologic disease and 3,7% masquerade syndrome.

MRI was contributive in 18 cases (4,5%): 4 cerebral lymphoma and 13 multiple sclerosis. None were anterior uveitis. Thirty one patients had neurological signs, and 13 (36,1%) of them had a contributive MRI. Among them, 13 (72%) had neurological signs. In the absence of neurological sign, only 1% of MRI were contributive.

**CONCLUSIONS:** This topic has been examined by only 2 small studies (166 and 66 patients) and none of these evaluated the usefulness of this exam according to the presence of neurological signs. Patients without neurological signs with a contributive MRI can be divided in 2 groups: the first one is multiple sclerosis patients in which case no specific treatment is needed, and the second is cerebral lymphoma patients, who were all above 40 years old. MRI appears to be relevant in specific cases, only in intermediate/posterior/pan uveitis with neurological signs or if the patient is older than 40 to rule out primary ocular-cerebral lymphoma.

**Keywords:** uveitis cerebralMRI diagnosis





ABSTRACTS OF ORAL PRESENTATIONS

Volume rendering of central macula flow using optical coherence tomography angiography:  
qualitative and quantitative characterization

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**OBJECTIVE:** To characterize central macula blood flow using a three-dimensional rendering of OCT-Angiography data and to evaluate the correlation with structural optical coherence tomography in normal eyes

**MATERIAL-METHODS:** Prospective, observational study with inclusion of normal patients. All subjects underwent high resolution OCTA 15x15 degrees macular scans (axial resolution 3.9µm/pixel and lateral resolution 5.7 µm/pixel) using Spectralis HRA+OCT2 (Heidelberg Engineering, Heidelberg, Germany). Three-dimensional rendering was issued using Imaris (Bitplane, Andor Technology plc.). Segmentation was automatically achieved using algorithms that employ a fast-marching method and an autopath algorithm based on intensity thresholds. Capillaries between branch points were measured and ordered following their position on the z-axis in two vascular complexes: deep and superficial. Capillaries size was characterized by plotting size vs number. Image processing was performed on MATLAB and statistical analysis in R.

**RESULTS:** Twenty eyes from healthy subjects were included, mean age was 44 +/- 12 years-old and 60% of patients were female. We identified three different plexuses (deep, middle and superficial) with vascular connections linking superficial and intermediate arterioles to deep capillary venules. Deep plexus capillaries had efferent vortex drainage and crossed the horizontal raphe. Goodness-of-fit methods showed that capillaries size followed an exponential distribution with statistical self-similarity between the two vascular complexes.

**CONCLUSIONS:** Our findings support the notion of three distinct retinal neurovascular units, with independent arteriolar feeding and draining venules. We provide the first evidence of statistical self-similarity in central macula flow and a new method to quantify 3D flow organization.

**Keywords:** OCTA; 3D Volume rendering; macula flow





ABSTRACTS OF ORAL PRESENTATIONS

Real-life study in diabetic macular edema treated with dexamethasone implant: a long time follow up results

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**OBJECTIVE:**To evaluate the efficacy and safety of intravitreal implant of dexamethasone (Ozurdex) for diabetic macular edema in real-life practice with a follow-up of 5 years.

**MATERIAL-METHODS:**In this multicentric retrospective study, the authors reviewed 227 eyes of 159 patients. Main outcome measures included changes in best-corrected visual acuity, central macular thickness, time to retreatment, and incidence of adverse effects. Linear mixed-effects models were used to study changes in best-corrected visual acuity and central macular thickness over the 5-year follow-up.

**RESULTS:**Best-corrected visual acuity increased by a mean of 5.7 letters at Month 2, 3.2 letters at Month 12, 5.1 at Month 24, 6.8 letters at Month 36, 15.0 letters at Month 42 and 14.7 letters at Month 60. The proportion of eyes achieving at least a 15-letter improvement from baseline during follow up was 35.8%. The proportion of eyes achieving at least a 15-letter improvement from baseline during follow up was 35.8% at Month 36. Central macular thickness decreased from 451 µm to 289 µm at Month 2 ( $P < 0.001$ ), 370 µm at Month 12 ( $P < 0.001$ ), 377 µm at Month 24 ( $P = 0.004$ ), and 280 µm at Month 36 ( $P = 0.001$ ). The proportion of eyes achieving a decrease in central retinal thickness (CMT) to obtain  $CMT < 300$  during follow up was 170 (74.9%).

A mean of 3.6 injections were administered over the 3-year follow-up. Ten percent of eyes developed a transient increase in intraocular pressure ( $IOP \geq 25$  mmHg), and cataract was removed from 47% of phakic eyes.

**CONCLUSIONS:**This large case series study showed favorable 5-year outcomes when using Ozurdex to treat diabetic macular edema. Intravitreal Ozurdex provides substantial long-term benefits in the treatment of diabetic macular edema in real-life.

**Keywords:** diabetic macular edema, dexamethasone implant,



ABSTRACTS OF ORAL PRESENTATIONS

AI in the real world: What are the perspectives

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**OBJECTIVE:**To analyze the disease progression and treatment response of patients with neovascular age-related macular degeneration (nAMD) in a real-world setting, by applying artificial intelligence (AI) methods on optical coherence tomography (SD-OCT) images.

**MATERIAL-METHODS:**We have collected the OCT images of nAMD patients, acquired between 2007 and 2017 in the Department of Ophthalmology at the Medical University of Vienna. The dataset consists of 21,361 OCTs acquired from 898 eyes of 703 patients in 10,883 visits. In addition, the visual acuity and anti-VEGF treatment dates were extracted from the electronic health record system. The baseline visit was defined as the latest captured OCT before the first treatment. The extracted OCTs were pseudonymized and converted to a standardized dicom format. An automated segmentation algorithm using deep learning was applied on the OCTs to detect and quantify intraretinal cystoid fluid (IRC) and subretinal fluid (SRF). The volume of these fluid compartments was computed in each cell of an early treatment diabetic retinopathy study grid.

**RESULTS:**The deep learning method allowed us to quantify the amount of fluid in our large OCT-dataset in a fully automated manner. The average of the total IRC volume decreased by 56% in the central millimeter subfield (48-61% in all ETDRS grid subfields) within the first year. During the same time SRF declined on average by 84% (76-87%).

**CONCLUSIONS:**AI is able to quantify different structures of the retina automatically. In conclusion, our study is a first step towards evaluation of therapeutic success of available treatment strategies both in drug and regimen. Thus, AI can be used to analyze retinal structures population-wide in a real-world setting as opposed to the well-studied setting of clinical trials.

**Keywords:** Artificial Intelligence, Optical coherence tomography, Retina, neovascular age-related macular degeneration, Real-world



ABSTRACTS OF ORAL PRESENTATIONS

Subretinal OCT-A hyper reflective signal in central serous chorioretinopathy: newvessels or not ?

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**OBJECTIVE:**To describe different patterns of OCT-A hyper reflective signals observed in central serous chorioretinopathy (CSC) and pachychoroid pigment epitheliopathy (PPE)

**MATERIAL-METHODS:**Retrospective multicenter study (Strasbourg, Lyon, CIL, Rothschild Ophthalmologic Foundation). Multimodal imaging of patients with central serous chorioretinopathy (CSC) and pachychoroid pigment epitheliopathy (PPE) were reviewed (Spectralis HRA+OCT (Heidelberg) or Triton (TopCon) device). The detected subretinal hypersignals on OCTA were classified according to their location regarding the BM or the RPE. Exclusion criteria: atrophy related hypertransmission, retinal hyperelective lesion inducing a signal blockage

**RESULTS:**Thirty four patients with CSC and 29 patients with PPE were analysed. Newvessels were formally identified in cases with flat irregular pigment epithelium detachment (FIPED) and hyperfluorescent lesion observed at the late stages of ICG angiography (ICGA). However in a few cases OCT-A hyper reflective signal was depicted without FIPED or hyperfluorescent lesion on ICGA suggesting choroidal remodeling.

**CONCLUSIONS:**The mechanism of formation of newvessels secondary to CSC and PPE may appear at several stages. Those different patterns may also correspond to lesions of different categories. Longitudinal study will be necessary to determine the true nature of those patterns

**Keywords:** Central serous chorioretinopathy, Pachychoroid pigment epitheliopathy, Flat irregular pigment epithelium detachment, OCT-A, ICG



ABSTRACTS OF ORAL PRESENTATIONS

Optical coherence tomography angiography findings in patients with PCV secondary to chronic central serous chorioretinopathy

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**OBJECTIVE:** To analyse optical coherence tomography (OCTA) findings in polypoidal choroidal vasculopathy (PCV) secondary to chronic central serous chorioretinopathy (CSC) in Caucasian patients.

**MATERIAL-METHODS:** Twenty eyes (17 consecutive patients) with a diagnosis of PCV secondary to CSC based on multimodal imaging, were retrospectively evaluated. A complete ophthalmological examination including best corrected visual acuity (BCVA), fluorescein and indocyanine green angiography (FA and ICGA), spectral-domain optical coherence tomography and OCTA.

**RESULTS:** OCTA revealed the branching neovascular network in 100% of the eyes as a hyperflow lesion in both choriocapillaris and outer retina layers. The OCTA choriocapillaris segmentation, in correspondence of the polypoidal dilation detected in ICGA, showed a hyperflow round structure in 75% of cases and hypoflow round structure in 15%; whereas in 20 eyes (10%) OCTA analysis did not depict any polyp.

**CONCLUSIONS:** OCTA is a valuable tool in detecting neovascular branching as well as aneurysmatic dilations and being a non-invasive imaging modality, it may represent a useful tool in monitoring the treatment efficacy.

**Keywords:** Central serous chorioretinopathy, optical coherence tomography angiography, polypoidal choroidal vasculopathy.



ABSTRACTS OF ORAL PRESENTATIONS

Ten years Outcomes of Treatment of Neovascular Age-Related Macular Degeneration: results of FRB France registry

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**OBJECTIVE:**To analyse the long terms outcomes of eyes with neovascular age-related macular degeneration (AMD) starting treatment with vascular endothelial growth factor (VEGF) inhibitors at least 10 years earlier.

**MATERIAL-METHODS:**This is a database observational study. Neovascular AMD tracked by the Fight Retinal Blindness France registry that received at least 1 anti-VEGF injection ten years earlier. The main outcomes measures were: change in mean VA and number of injections and visits from baseline up to 10 years after initiating treatment.

**RESULTS:**116 eyes out of 94 patients were analysed. Mean VA decreased from 57,7 to 39,9 letters after 10 years. 47% had VA > 70 (20/40) letters, and 16% had VA < 35 letters (20/200). Of those with 20/40 VA before treatment, 40% had lost it after 7 years. Geographic atrophy affecting the fovea was present in 78% of cases after ten years whereas subfoveal fibrosis was observed in 55% of cases. A median of 4 injections and 7 visits were recorded over the first 12 months, and then a mean of 2,6 treatments and 4 visits per annum thereafter through 10 years. The rate of serious adverse events was low.

**CONCLUSIONS:**This study provides the longest follow-up of anti-VEGF therapy in exudative AMD. Long term prognosis remains poor after 10 years follow up. Subfoveal GA developping around the time may be the leading cause of visual loss. Further studies to determine how to maximize the proportion of eyes that stabilize their vision are warranted.

**Keywords:** AMD, antivegf therapy, long term outcomes



ABSTRACTS OF ORAL PRESENTATIONS

Sub-retinal pigment epithelium-basal lamina hyperreflective crystalline deposits in non-neovascular age-related macular degeneration: multimodal imaging and prognostic implications

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**OBJECTIVE:**To describe morphological features associated with sub-retinal pigment epithelium-basal lamina hyper-reflective crystalline deposits (HCD), believed to represent cholesterol crystals, detected on multimodal imaging and their prognostic implications in non-neovascular age-related macular degeneration (AMD).

**MATERIAL-METHODS:**Retrospective review of medical records, multimodal imaging, and longitudinal eye-tracked NIR and OCT spanning  $\geq 2$  years. Spectral-domain optical coherence tomography (SD-OCT) was performed using Spectralis HRA+OCT (Heidelberg Engineering, Germany), and the swept-source (SS) OCT images acquired using the PLEX Elite 9000 SS-OCT (Carl Zeiss Meditec, Inc, Dublin, CA).

**RESULTS:**A total of 33 patients (33 eyes) with mean age of  $72 \pm 7.5$  years were analyzed with serial-tracked near-infrared (NIR)/OCT. Mean best-corrected visual acuity (BCVA) was 0.44 LogMAR (Snellen equivalent 20/55) at baseline. Thirty-one of 33 eyes (93.9%) had developed macular complications including de novo areas of complete retinal pigment epithelium and outer retinal atrophy (cRORA) in 21/33 (64%) eyes, enlargement of pre-existing cRORA in 4/33 (12%) eyes, and incident macular neovascularization in 3/33 (9%) eyes after 11.3 months (CI95%: 3.1, 19.6). BCVA was decreased to 0.72 LogMAR (20/105) at last follow-up. In 9 eyes of 9 patients (mean age:  $78 \pm 9.02$  years) simultaneously imaging with SD-OCT and SS-OCT showed unusual optical artifacts. With SS-OCT, 1 or multiple A-scans crossing the HCD showed intense reflectivity spanning the entire scan height which corresponded to shadowing artifacts on SD-OCT B-scans seen anterior to the lesions.

**CONCLUSIONS:**Eyes with non-neovascular AMD and HCD are at high risk for macular complications. The OCT appearance of HCD, including characteristic SS-OCT and SD-OCT artifacts, coupled with prior direct imaging-histology comparison, support that these lesions are cholesterol crystals, rather than other reflective deposits occurring in eyes with non-neovascular AMD.

**Keywords:** age-related macular degeneration, cholesterol crystals, multimodal imaging, spectral-domain optical coherence tomography, swept-source.



ABSTRACTS OF ORAL PRESENTATIONS

Ten-year incidence and progression of diabetic retinopathy in type 1 and type 2 diabetes mellitus in France and its impact on screening strategy: the OPHDIAT study

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**OBJECTIVE:**To estimate the 10-year incidence and progression of diabetic retinopathy, their risk factors and optimum screening time periodicity in a French population with type 1 and 2 diabetes mellitus which participated to a regional screening program for diabetic retinopathy. OPHDIAT is a telemedical network that has been in effect since 2004 in the Ile-de-France region.

**MATERIAL-METHODS:**DESIGN: Observational, prospective and multicentric study between June 2004 and September 2017.

**PARTICIPANTS:** A total of 25,745 participants with type 1 (n= 6,086) or type 2 (n= 19,659) diabetes mellitus and at least 2 screening examinations who were free of referable diabetic retinopathy at baseline were included.

**MAIN OUTCOMES AND MEASURES:** Incidence of retinopathy and progression of retinopathy

**RESULTS:**In patients with type 1 and 2 diabetes mellitus, the annual incidence (95% confidence interval) of any retinopathy was 11.98% (10.62 to 13.36) and 9.24% (8.55 to 9.88), respectively, in the first year. The 10-year cumulative incidence of any retinopathy was 58.56% (55.97 to 61.11) and 45.96% (44.26 to 47.67), respectively, and the 10-year cumulative incidence of retinopathy progression was 46.99% (41.55 to 52.51) and 41.93% (37.41 to 46.58). Risk factors for the incidence and progression of retinopathy in type 1 and 2 diabetes were known duration of diabetes and glycemic control. Male sex and insulin therapy were risk factors in type 2. The screening time periodicity for an 85% probability of remaining free of referable DR for type 2 diabetic patients with no retinopathy at baseline, no insulin therapy and HbA1C < 7.5% was > 10 years.

**CONCLUSIONS:**In screening program, the severity of retinopathy at baseline and risk factors such as duration of diabetes, glycemic control and insulin treatment should be considered in adjusting optimal screening time periodicity

**Keywords:** epidemiology, screening, diabetic retinopathy



ABSTRACTS OF ORAL PRESENTATIONS

Ten-Year Treatment Outcomes of Neovascular Age-Related Macular Degeneration

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**OBJECTIVE:**Phase 3 clinical trials established that frequent intravitreal injections of vascular endothelial growth factor (VEGF) inhibitors were beneficial for neovascular age-related macular degeneration (nAMD) in the short term. Many eyes with nAMD in real world clinical practice, however, have now been receiving injections for over ten years. There are currently no data on long term outcomes to guide how eyes should be treated after the condition has been stabilized in the early phase of the treatment journey.

**MATERIAL-METHODS:**Treatment-naïve eyes with nAMD starting injections of VEGF inhibitors at least 10 years earlier were tracked in the Fight Retinal Blindness! Project outcomes registry. Visual outcomes and treatment practices over 10 years were compared in eyes from two regions: Australia & New Zealand (ANZ) and Switzerland.

**RESULTS:**A total of 712 eyes (ANZ-474;Switzerland-321) were identified. The mean VA in 132 eyes (28%) from ANZ that completed 10 years of continuous treatment dropped by 0.9 LogMAR letters from baseline (95%CI:-4.9,3.1)(p=0.7) at 10 years while the 37 eyes(12%) from Switzerland lost 14.9 letters (95%CI:-24,-5.7) (p<0.001). More eyes with VA  $\geq$ 20/40 at presentation completed 10 years of treatment. Eyes from ANZ received more injections (median 53) with fewer visits than eyes from Switzerland (median 42), indicating that eyes from ANZ received a treat and extend regimen whereas Swiss eyes were treated pro re nata. Mean VA of eyes from both regions that discontinued treatment within 10 years had fallen below the baseline at their final visit.

**CONCLUSIONS:**Eyes with nAMD may achieve satisfactory long-term visual outcomes if they receive adequate treatment. Central macular atrophy does not develop universally in eyes receiving 10 years of treatment with VEGF inhibitors as previously feared. Eyes with better vision tended to continue treatment longer with better visual outcomes. Visual outcomes were better in eyes from ANZ, likely because they received more injections.

**Keywords:** Treatment outcomes, 10 years, FRB!, real world outcomes, anti-VEGF





ABSTRACTS OF ORAL PRESENTATIONS

Visual and expanded anatomical outcomes for brotacizumab versus aflibercept in patients with neovascular AMD: 96-week data from HAWK and HARRIER

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**OBJECTIVE:**To report the outcomes over 96 weeks in HAWK and HARRIER, two Phase III, prospective studies that assessed the efficacy and safety of brotacizumab (Bro) versus aflibercept (Afl) in patients with nAMD. **MATERIAL-METHODS:**Patients were randomized 1:1:1 to Bro 3 mg (n=358), Bro 6 mg (n=360) or Afl 2 mg (n=360) [HAWK], or 1:1 to Bro 6 mg (n=370) or Afl 2 mg (n=369) [HARRIER]. After three monthly loading doses, Bro patients received q12w dosing with an option to adjust to q8w at predefined disease activity assessment visits; Afl was dosed in a fixed q8w regimen. **RESULTS:**In HAWK and HARRIER, Bro was non-inferior to Afl in mean BCVA change from baseline at Week 48 (primary endpoint) and the visual gains were maintained to Week 96. Bro achieved superior reductions compared with Afl in CST from baseline to Week 16 and Week 48, and these were also maintained at Week 96 (HAWK: P=0.00105 [Bro 3 mg vs Afl]; P=0.00575 [Bro 6 mg vs Afl]; HARRIER: P<0.0001. These visual and anatomical outcomes were achieved with over 75% of Bro 6 mg patients who completed Week 48 on a q12w interval remaining on a q12w interval until Week 96. Distribution of fluid free visits will be presented. **CONCLUSIONS:**The superior anatomic outcomes in IRF and/or SRF and CST at Week 16 and 48 along with the comparable vision gains seen with Bro 6 mg versus Afl at 48 were maintained at Week 96. Bro achieved better fluid control with more patients remaining fluid-free at Week 96 compared with Afl. **Keywords:** wAMD, anatomical outcomes, fluid control, brotacizumab, anti-VEGF



ABSTRACTS OF ORAL PRESENTATIONS

The potential of retinal rejuvenation therapy, 2RT, as an early intervention for AMD

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**OBJECTIVE:**To present the underlying science which resulted in the development of the 2RT Laser and to evaluate the biophysics and biochemistry of beam tissue interactions to improve therapeutic applications to optimise clinical outcomes.

**MATERIAL-METHODS:**Human pigment epithelial cells together with their associated Bruchs membrane were clamped at the interface of modified Ussing Chambers in order to evaluate the effects of different beam profiles and lesion numbers on the magnitude and species of released MMPs and the action of the latter on transport processes through Bruch's membrane.

**RESULTS:**Optimal release of MMPs 3 and 9 and subsequent increase in transport processes were seen with pixelated beams where the foci of damage were separated by a distance of at least two pigment epithelial cells. There was a dose response relationship showing direct correlation between the concentration of MMPs and the number of laser irradiations. Peak MMP release was recorded 7 to 10 days post irradiation.

**CONCLUSIONS:**The laboratory studies suggest that optimal clinical results will be obtained by both modulating the pixelation of the laser beam and increasing the number of impacts for any given treatment. The recent Australian trial showed that even a limited number of lesions with this laser resulted in a 78% reduction in the rate of progression from dry to the vascular AMD.The laboratory studies define the underlying mechanism and suggest that more lesions would result in further improvement in outcome.

**Keywords:** 2RT, retinal rejuvenation therapy, AMD



ABSTRACTS OF ORAL PRESENTATIONS

Phase I/IIa Clinical Trial of Human Embryonic Stem Cell (hESC)-Derived Retinal Pigmented Epithelium (RPE, OpRegen) Transplantation in Advanced Dry Form Age-Related Macular Degeneration (AMD): Interim Results

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**OBJECTIVE:** To report safety and tolerability of subretinal transplantation of RPE cells from hESCs using GMP directed differentiation in a Phase I/IIa clinical study in patients with advanced AMD and geographic atrophy (GA) (NCT02286089). We report accumulated safety and imaging data from all subjects in the fully-enrolled first 3 cohorts (n=12) and ongoing 4th cohort.

**MATERIAL-METHODS:** Transplantation by subretinal injection via pars plana vitrectomy of 50-200k OpRegen cells in suspension to the worse vision eye. Systemic immunosuppression prior and until 3 months after implantation. Systemic and ocular safety are closely monitored. Retinal function and structure are monitored using BCVA, color fundus, SD-OCT, and FAF.

**RESULTS:** Following completion of the first 3 cohorts, now under long term follow-up, dosing of cohort 4 is ongoing. Overall, treatment has been well tolerated and there have been no unexpected adverse events (AEs) or treatment-related systemic serious AE reported. The most common ocular AEs were the formation of predominately mild epiretinal membranes (ERM), though one severe ERM was successfully peeled 2 months following dosing. Additionally, one patient experienced a retinal detachment. Causality of the event was not able to be determined and the patient continues in the study following successful surgical repair. Within the area of the RPE cell transplant, signs of changes in drusen as well as improvements of the ellipsoid zone and RPE layers at the border of GA were seen in some subjects. Persistent changes observed following treatment, including subretinal pigmentation and hyper-reflective areas on OCT, are suggestive of the continued presence of transplanted RPE cells.

**CONCLUSIONS:** Subretinal transplantation of hESC-derived RPE cells in patients with advanced dry AMD and GA appears well tolerated to date. Imaging findings suggest presence of transplanted cells in the subretinal space. Potentially positive structural and clinical changes observed in some patients will require additional follow-up over time.

**Keywords:** geographic atrophy, age-related macular degeneration, dry AMD, stem cell, retinal pigment epithelium, transplantation



ABSTRACTS OF ORAL PRESENTATIONS

**Brimonidine Safety and efficacy in patients with geographic atrophy secondary to AMD**

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**OBJECTIVE:** Assess efficacy and safety of Brimonidine Drug Delivery System (Brimo DDS) vs sham in patients with geographic atrophy (GA) secondary to age-related macular degeneration (AMD).

**MATERIAL-METHODS:** In a Phase 2b, multicenter, randomized, double-masked study (BEACON), patients received Brimo DDS 400µg (n=154) or sham (n=156) in the study eye through Month 21. Mean change in GA lesion area, standard and low luminance best corrected visual acuity (BCVA) were assessed at baseline to Month 30, along with safety.

**RESULTS:** 53.2% (Brimo DDS) and 54.5% (sham) of patients finished the Month 24 primary endpoint. Brimo DDS reduced GA progression by 0.36 mm<sup>2</sup> (p=0.047, Month 24) and 0.52 mm<sup>2</sup> (p=0.017, Month 30), 10 and 12% reduction, respectively. BCVA was progressively reduced over the course of the study in both groups (~2-3 lines on ETDRS chart) and Brimo DDS did not slow the progression of vision loss. Overall treatment-emergent adverse events (TEAEs) were similar across groups. Overall Ocular TEAEs were moderately higher with Brimo DDS treatment (62.3% vs 45.5% sham). **CONCLUSIONS:** Brimo DDS reduced GA enlargement in AMD compared to sham at Month 24 and 30. These results support a Phase 3 program that is under way.

**Keywords:** AMD, geographic atrophy, brimonidine, implant, cytoprotection, neuroprotection



ABSTRACTS OF ORAL PRESENTATIONS

Evaluation of Baseline Characteristics on Lesion Progression in a Large Phase 2 Clinical Trial for Geographic Atrophy (FILLY Study)

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**OBJECTIVE:** To evaluate the impact of select baseline characteristics on progression of geographic atrophy (GA) in eyes receiving treatment with APL-2 or sham.

**MATERIAL-METHODS:** The FILLY trial was a 246-patient Phase 2 multicenter, randomized, single-masked, sham-controlled clinical trial of APL-2 in patients with GA. Intravitreal injections of APL-2 were administered in the study eye monthly or every other month (EOM) for 12 months. The primary efficacy endpoint was the square root change in GA lesion size from baseline to Month 12 as compared to sham. The effect of select baseline characteristics (gender, baseline GA lesion size and lesion type [unifocal or multifocal]) on mean change in GA lesion size at Month 12 was analyzed. Only patients with observed data at Month 12 were included.

**RESULTS:** The FILLY phase 2 study met its primary endpoint. The overall mean change in GA square root lesion size (mm) at 12 months from baseline was 0.26 (SD 0.17, 95% CI 0.21-0.29,  $p < 0.05$ ) in the monthly APL-2 ( $n=67$ ), 0.27 (SD 0.26, 95% CI 0.20-0.33,  $p = 0.067$ ) in bi-monthly APL-2 ( $n=58$ ), and 0.36 (SD 0.21, 95% CI 0.30-0.41) in the sham ( $n=67$ ) groups, respectively. Changes in lesion size by select baseline factors are summarized in Table 1.

**CONCLUSIONS:** Benefit of treatment with APL-2 was observed across all selected subgroups of baseline factors. Treatment with APL-2 trended to be more effective in controlling GA progression with increasing baseline lesion size in a non-linear manner. The impact of active treatment was observed irrespective of lesion type. Phase 3 studies will further evaluate the efficacy and safety of APL-2.

**Keywords:** Geographic atrophy, dry AMD, AMD, clinical trials



ABSTRACTS OF ORAL PRESENTATIONS

Brolucizumab versus aflibercept for neovascular AMD: expanded fluid analyses from the HAWK and HARRIER studies

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**OBJECTIVE:**To present the 48-week expanded fluid analyses of two phase 3, prospective studies that evaluated the efficacy and safety of brolucizumab vs aflibercept in neovascular age-related macular degeneration  
**MATERIAL-METHODS:**HAWK and HARRIER were 96-week, prospective, double-masked, multi-center studies. Patients were randomized 1:1:1 to brolucizumab 3mg, 6 mg or aflibercept 2 mg (HAWK) or 1:1 to brolucizumab 6mg or aflibercept 2 mg (HARRIER). After three monthly loading doses, brolucizumab patients received q12w dosing with an option to adjust to q8w at predefined disease activity assessment visits; aflibercept was dosed in a fixed q8w regimen  
**RESULTS:**At Week 48, 58.4% (3mg) and 64.2% (6mg) of brolucizumab vs 49.4% aflibercept patients in HAWK (3mg,  $p=0.0234$ ; 6mg,  $p=0.0001$ ), and 64.9% of brolucizumab vs 48.0% aflibercept patients in HARRIER ( $p<0.0001$ ) achieved complete fluid resolution. The proportions of patients who were fluid-free (absence of SRF, IRF and sub-RPE) at Week 96 were higher for Bro 6 mg than Afl in HAWK (71.3% [Bro]; 58.8% [Afl],  $P=0.0006$ ) and HARRIER (64.8% [Bro]; 52.4% [Afl],  $P=0.0009$ ). The difference in favor of brolucizumab was already noted during the matched treatment phase up to Week 16.  
**CONCLUSIONS:**These post hoc analyses support the superior fluid control with brolucizumab as already observed in the predefined analyses.

**Keywords:** wAMD, anatomical outcomes, fluid control, brolucizumab



ABSTRACTS OF ORAL PRESENTATIONS

Outcomes of Suspending VEGF Inhibitors for Neovascular Age-Related Macular Degeneration  
when Lesions Have Been Inactive for 3 Months

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**OBJECTIVE:** There is currently little evidence that it is safe to suspend vascular endothelial growth factor (VEGF) inhibitors for neovascular age-related macular degeneration (nAMD). We assessed the outcomes of eyes where this appeared to have been attempted.

**MATERIAL-METHODS:** This was an observational study from a prospectively designed database. Eyes enrolled in the Fight Retinal Blindness! registry of nAMD treatment outcomes were considered to have suspended treatment if they had a  $\geq 3$  month documented period of inactivity of the choroidal neovascular lesion with no further treatments unless the lesion reactivated. Visual outcomes following treatment suspension were assessed with paired t-tests. Main outcome measures included the proportion of eyes resuming treatment due to lesion re-activation, change in visual acuity (VA) at time of re-activation and recovery of vision 12 months later.

**RESULTS:** We identified 434 eyes that suspended treatment and were tracked for at least 12 months thereafter. Estimated percentage of eyes re-activating in the first year following treatment suspension was 41%, increasing to 79% by the fifth year. The median time to re-activation was 504 days. The 275 eyes whose lesion was observed to re-activate lost a mean of 4.2 letters (95%CI: -5.6, -2.8;  $P < 0.001$ ) from the last injection to time of re-activation; 206 eyes resumed treatment for at least 12 months after re-activation and recovered a mean of +1.2 letters (95%CI: -0.4, 2.7;  $P = 0.133$ ), resulting in a net loss of 3.3 letters (95%CI: 2.3, 5.1;  $P < 0.001$ ) compared with VA at treatment suspension.

**CONCLUSIONS:** Fewer than half of the eyes in which treatment was suspended re-activated in the first year, but most re-activated by the fifth year. Caution should be exercised to avoid suspending treatment prematurely. Further research is warranted to identify which eyes might be able to suspend treatment safely. Data indicate that eyes with worse vision treated for  $\geq 3$  years are less likely to reactivate once treatment has been suspended.

**Keywords:** Outcomes, suspending VEGF, neovascular AMD, disease activity, treatments



ABSTRACTS OF ORAL PRESENTATIONS

**Luxturna, the first approved gene therapy for RPE65 mutation related retinal dystrophy:: Our first surgery experience**

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**OBJECTIVE:** Report the observations during surgery and short term results following Luxturna sub retinal injections in the first two patients treated at the CHNO des Quinze-Vingts.

**MATERIAL-METHODS:** Two young sisters of 10 and 8 years presenting Leber Congenital Amaurosis received the Luxturna treatment between December 2018 and February 2019 on both eyes at one week (7 days between each eye). Surgical posterior vitreous detachment, sub retinal injection and air fluid exchange have been performed surrounded by oral Prednisolone.

Follow up was day one, day six, one month and three months after the surgery. Visual Acuity (VA), Goldman Visual Field, retinal sensitivity (FST) have been assessed before and after the bilateral sub retinal Luxturna injections. The assessment included also general ocular exams, and retinal imaging (Fundus photography, Fundus Autofluorescence and OCT).

**RESULTS:** During the surgery we noticed:

- Posterior vitreous detachment was not so easy in the first case. So we decided after to use dye.
- Subretinal injection did not induce macular detachment in one case.
- A peripheral retinal tear in one case needed a laser treatment.

At day 1

- In all cases we observed desiccation transitory cataracts resolved at day six.

At day 6

- In one case we found intraocular hypotonia spontaneously resolved after protection of the eye.
- Micro inner retinal folds noticed on OCT imaging were resolved in one month in each case.

At one month, all ocular exams and retinal imaging were normalised and adverse events resolved.

No significant inflammatory have been observed during follow up..

The visual function have improved in all eyes.

**CONCLUSIONS:** Our first surgical experience need to be discussed and shared. Long term follow up, surgical experience and additional data from larger numbers of patients will contribute to evaluate with more precision the indications, the real benefits and the modes of delivery of this therapeutic innovation.

**Keywords:** Luxturna, RPE65 mutation surgery





ABSTRACTS OF ORAL PRESENTATIONS

Human Amniotic Membrane plug to promote recurrent macular hole closure

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**OBJECTIVE:**to describe the surgical outcomes of twenty patients treated for persistent macular hole using an Amniotic Membrane plug to promote macular hole closure.

**MATERIAL-METHODS:**Twenty patients with persistent macular hole who undergone pars plana vitrectomy with internal limiting membrane peeling and gas tamponade without resolution, followed by pars plana vitrectomy and implant of the amniotic membrane plug in macular hole. Gas endo tamponade was chosen depending on the dimension of the macular hole.

**RESULTS:**successful macular hole closure was achieved in all eyes during first week follow-up. mean best corrected visual acuity preoperatively were 20/400 and postoperatively were 20/32. no postoperative complication were reported during 12 months follow-up.

**CONCLUSIONS:**the human amniotic membrane plug promotes recurrent macular hole closure. No adverse events were observed during the follow-up period.

**Keywords:** recurrent macular hole, amniotic membrane, vitreoretinal surgery



# POSTER ABSTRACTS



POSTER ABSTRACTS

P-001

Is current age related macular degeneration self-monitoring a good tool for detecting exudative recurrence ?

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**OBJECTIVE:** To assess the ability of patients with exudative AMD to predict the exudative recurrence. Other objective was to assess the contribution of self-monitoring in improving this ability.

**MATERIAL-METHODS:** An observational and cross-sectional study was led in the ophthalmic center of Beausoleil clinic in Montpellier between March, 1st and April, 1st 2016. Inclusion criteria were patients diagnosed with neovascular age related macular degeneration, who had completed the loading dose of three-monthly intravitreal anti-VEGF injections, with at least one injection in the past 12 months and at least one exudative recurrence. All patients underwent a visual acuity measurement with ETDRS charts at 2 meters. A questionnaire assessed the achievement of a self-monitoring at home and its type: Amsler grid, environmental Amsler, both; the knowledge of the Amsler grid and its realization and the subjective feeling of an exudative recurrence at the visit with a 5-level Likert scale.

**RESULTS:** A total of 94 eyes of 70 patients were included in this study with 69.0% of women and a median (interquartile range) age of 83 (77-96) years old. Sensitivity (95% confidence interval, 95% CI) and specificity (95% CI) of exudative recurrence subjective feeling were 0.32 (0.14-0.55) and 0.85 (0.74-0.92), respectively, in the whole population. Sensitivity (95% CI) and specificity (95% CI) were 0.33 (0.13-0.59) and 0.85 (0.74-0.93); 0.25 (0.0063-0.81) and 0.82 (0.48-0.98), respectively, in patients performing and not performing self-monitoring.

**CONCLUSIONS:** Patients' prediction in wet AMD is not sufficient to detect exudative recurrences, even if usual self-monitoring with Amsler grid or environmental Amsler is realised.

**Keywords:** AMD, self-monitoring, Amsler



POSTER ABSTRACTS

P-002

National survey on the management and information practices of patients with wet AMD

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**OBJECTIVE:**According to the WHO, AMD is the world's third leading cause of visual impairment and accounts for almost 9% of all causes of blindness. Our work aimed to collect information practices with a multicentric survey on patients suffering from wet AMD.

**MATERIAL-METHODS:**Two types of questionnaires, developed by a committee of ophthalmologists and a psychologist to collect data at one (M + 1) or twelve (M + 12) months after diagnosis. The assessed criteria focused on patients' profile, their management, their understanding and experience versus the disease and the treatment.

**RESULTS:**If most of patients have declared to be satisfied with the explanations provided by the medical staff on the treatment (6.7/10), 16% of M+1 patients looked for additional information about their treatment, mainly on the Internet. Moreover, 43% of patients do not know how many injections they will get in the coming year. More than 8 in 10 M+12 patients are likely to continue treatment and monitoring at the same rate as in the past 12 months. Besides, 58% of the respondents reported that the number of injections fits them well and 43% are mainly neutral because they have confidence in their practitioner. With a 3.8/10 score, the patients' apprehension towards the injection is moderate, especially as it is perceived as tolerable (7.0/10). Moreover, the impact of the treatment on daily life is limited (2.6/10). At last, whereas most of the patients think that the treatment can stabilize or improve their sight, 37% of M+1 patients and 22% of M+12 patients are expecting a full recovery.

**CONCLUSIONS:**This survey demonstrated a gap between the information provided by the medical staff from one side and the apprehension towards the injection and the patient experience on the other.

**Keywords:** Quality of life - Medical information - AMD



POSTER ABSTRACTS

P-003

Subretinal drusenoid deposits in the elderly in a population-based study (the Montrachet study: Maculopathy, Optic Nerve, nuTRition, neuroAsCular and HEarT diseases)

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**OBJECTIVE:**The aim of this study was to investigate the prevalence of subretinal drusenoid deposits (SDD) and to identify associated factors in an elderly population.

**MATERIAL-METHODS:**The participants of the population-based Montrachet (Maculopathy Optic Nerve, nuTRition neurovAsCular and HEarT) study underwent an exhaustive ophthalmologic examination, including color fundus photography and macular spectral domain-optical coherence tomography coupled with infrared reflectance imaging. The presence of SDD, classification of the European Eye Epidemiology spectral-domain optical coherence tomography classification of macular diseases and subfoveal choroidal thickness were recorded. Meanwhile, the association of SDD and both clinical and demographic factors and plasma levels of Vitamin E and Lutein/Zeaxanthine (L/Z) were analysed using general estimating equation multivariate logistic models.

**RESULTS:**The mean age was  $82.3 \pm 3.8$  years and 62.7% were female. The prevalence of SDD was 18.1% (n=205) in the subjects with at least one eye interpretable (n=1135). In multivariate analysis, SDD was positively associated with increasing age (OR, 4.6; 95% CI, 2.8-7.7;  $P < 0.001$  for subjects aged  $>85$  years old), female gender (OR, 1.7; 95% CI, 1.2-2.4;  $P = 0.005$ ) and plasma L/Z level (OR, 1.2; 95% CI, 1.0-1.5;  $P = 0.039$ ), and negatively associated with lipid-lowering drugs use (OR, 0.5; 95% CI, 0.3-0.9;  $P = 0.014$  for statin medications) and subfoveal choroidal thickness (OR, 0.8; 95% CI, 0.7-0.9;  $P = 0.002$ ).

**CONCLUSIONS:**The prevalence of SDD was high in subjects older than 75 years old, more frequent in women and associated with a thinner choroid. The association with lipid-lowering drugs deserves further investigations.

**Keywords:** Subretinal drusenoid deposits, Reticular pseudodrusen, Prevalence, Age-related macular degeneration, elderly, population-base study.



POSTER ABSTRACTS

P-004

Multimodal imaging of choroidal neovascularization complicating basal laminar drusen

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**OBJECTIVE:**To analyse multimodal imaging including optical coherence tomography angiography aspects in a case of basal laminar drusen complicated with choroidal neovascularization (CNV).

**MATERIAL-METHODS:**The clinical course and multimodal imaging findings, including fundus color photography, fundus autofluorescence, swept-source optical coherence tomography (SS-OCT), fluorescein angiography (FA) and optical coherence tomography angiography (OCTA) of one eye with choroidal neovascularization complicating basal laminar drusen was documented.

**RESULTS:**A 42 year-old man with a history of high blood pressure, presented with a recent visual decline in the right eye (RE). Best-corrected visual acuity was limited to counting fingers in the RE and was 10/10 on the left eye. Slit lamp examination of the anterior segment and the vitreous was unremarkable in both eyes. Fundus examination revealed multifocal yellowish deposits in the posterior pole and in the mid-periphery in both eyes, with an elevated macular lesion on the RE. Fluorescein angiography showed hyperfluorescent macular lesion in the RE. The SS-OCT showed multiple drusenoid deposits with flat irregular pigmented epithelium detachments on both eyes. The OCTA revealed clearly the presence of choroidal neovascularization at the level of the external retina in the RE. The patient was treated with 2 intravitreal bevacizumab injections with stabilization of the lesion.

**CONCLUSIONS:**Basal laminar drusen or cuticular drusen is an uncommon entity that is now considered to be part of a spectrum of disease that includes age-related macular degeneration. The development of vitelliform macular lesions, CNV and geographic atrophy may cause vision loss. OCTA can be a useful tool for monitoring and detecting early CNV in this disease.

**Keywords:** optical coherence tomography angiography, choroidal neovascularization, drusen



POSTER ABSTRACTS

P-005

Optical coherence tomography angiography findings in exsudative age-related macular degeneration: Comparison between type 1 and type 2 choroidal neovascularization

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**OBJECTIVE:**To assess optical coherence tomography angiography (OCTA) sensibiliy in detecting type 1 and 2 choroidal neovascularization (CNV) in exsudative age-related macular degeneration (AMD) and to analyze the characteristics of each type of CNV.

**MATERIAL-METHODS:**RetrospectivestudyofeyeswithexsudativeAMD.Allpatientsunderwentfundusexamination,fluorescein angiography, indocyanine green angiography and swept source optical coherence tomography (OCT) and angiography (OCTA). We studied the detection sensibility of CNV using OCTA, analyzed the CNV location, measured its area and identified the presence of feeder vessel. We analyzed the areas of choriocapillaris rarefaction. OCTA activity criteria in type 1 and 2 CNV were compared.

**RESULTS:**Twenty-two eyes were included. All eyes presented active CNV with a type 1 CNV in 13 eyes and type 2 CNV in 9 eyes. OCTA could detect a hypersignal vascular network in 11 eyes with type 1 CNV (sensitivity = 82%) and a well defined hypersignal vascular network in all eyes with type 2 CNV (sensitivity = 100%). Most lesions were visible on both outer retina and choriocapillaris slabs, regardless of the type of CNV. Type 2 CNVs seemed to be larger lesions with a mean CNV area of 3,39 mm<sup>2</sup>, while type 1 CNVs mean area was 1,78 mm<sup>2</sup>. We could identify a feeder vessel on OCTA in 15% of type 1 CNV cases and 56% of type 2 CNV cases. OCTA activity criteria were found in all type 2 CNV cases (100%) and only 46% of type 1 CNV cases. Choriocapillaris rarefaction was observed in 50% of cases.

**CONCLUSIONS:**OCTA is a useful tool in detecting CNV in neovascular AMD. Detection sensitivity seems to be higher in cases of type 2 CNV and type 2 CNV were larger and better defined than type 1 CNV. Moreover, OCTA activity criteria seem to be more reliable in type 2 CNV.

**Keywords:** AMD, Age-related macular degeneration, Choroidal neovascularization, Optical coherence tomography angiography, OCTA



POSTER ABSTRACTS

P-006

SD-OCT « subretinal evanescent hypo-reflectivity » in age-related macular degeneration

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**OBJECTIVE:** Spectral-domain optical coherence tomography (SD-OCT) allows the detection of exudative and non exudative signs in eyes with age-related macular degeneration (AMD). The purpose of this study was to describe and analyse a new SD-OCT sign that we called « subretinal evanescent hypo-reflectivity » (SEHR).

**MATERIAL-METHODS:** Consecutive patients presenting between december 2016 and december 2017 with AMD (early and late neovascular) who had a SEHR without exudative signs on SD-OCT were included. Clinical examination and SD-OCT (Spectralis, Heidelberg Engineering, Heidelberg, Germany) were analyzed at the inclusion and monthly, starting from one month before until 2 months after inclusion.

**RESULTS:** Twenty-three eyes of 22 patients were included. Three eyes had early AMD and 20 late exudative AMD: 15 eyes with type 1 macular neovascularization (MNV), 3 with type 2 MNV and 1 with type 3 MNV; and 1 eye geographic atrophy (GA). Among eyes with early AMD, none developed exudative signs on SD-OCT during the 2 months of follow-up. The eye with GA did not develop exudative signs within the 2 months of follow-up. Among eyes with nAMD, 13/19 (68%) did not develop exudative signs on SD-OCT within the 2 months of follow-up whereas 6/19 (32%) developed exudation: 4 eyes (3 type 1 MNV and 1 type 2 MNV) presented exudative signs at 1 month and 2 eyes at 2 months (1 type 1 MNV and 1 type 2 MNV).

**CONCLUSIONS:** SEHR is a new SD-OCT sign in patients with AMD. It should not be considered as an exudative sign as it is not related to exudation in 68% of eyes with neovascular AMD and could even be present in eyes with early AMD or GA.  
**Keywords:** Spectral-domain optical coherence tomography; age-related macular degeneration, subretinal evanescent hyporeflectivity





POSTER ABSTRACTS

P-007

Medical practices overview in neovascular age-related macular degeneration: evaluating changes in France between 2013 and 2019

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**OBJECTIVE:**To capture and better understand medical practices in France, ophthalmologists were surveyed regarding their treatment strategies between 2013 and 2018. This present survey in 2019 will identify the changes that have occurred since 2013.

**MATERIAL-METHODS:**Kantar Health Institute will conduct a quantitative survey among 200 ophthalmologists (120 general ophthalmologists; 80 retinal specialists) from January to March 2019. Most of the survey questions are similar to those addressed previously and some have been added to capture new insights in medical practices. In particular, the survey will evaluate i) diagnosis and treatment trends and ii) logistical organization and access to care for nAMD patients.

**RESULTS:**When available, the results of the 2019 survey will highlight the changes in the management of nAMD from 2013 through 2019 and, if statistically relevant, these results will be stratified according to the number or injections administered by visit. The 2013, 2015, 2016, 2017 and 2018 surveys underscored an improvement in the management of patients with nAMD in real-world settings although treatment regimens used by retinal specialists were shown to be highly variable. In 2018, time spent in the center by patient for intravitreal injection was shorter than for a follow-up visit (< 45 min and between 45 and 75 minutes, respectively, for the majority of physicians). The proportion of retina specialists performing bilateral injections on the same day slightly decreased compared with 2017 (69% vs 75% respectively). Digital solutions such as smartphone applications could facilitate patient follow-up for 70% of ophthalmologists. The 2019 survey results are expected in March 2019.

**CONCLUSIONS:**A comparison of this survey with those from 2013 to 2018 will provide new insights into nAMD patient management in France.

The results from this 2019 survey will be valuable to understand changes in medical practice over 6 years, and highlight areas for improvement and emerging trends.

**Keywords:** AMD, survey, France, ophthalmologists, practices, 2019



POSTER ABSTRACTS

P-008

Patient-reported Outcome and Experience Measure (POEM) in Wet Macular Degeneration (MD)

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**OBJECTIVE:**To understand the patient experience of those with wet MD, through the assessment of perceived level of understanding of the condition and its management, acceptability of treatment and side-effects, interference on daily living and level of concern surrounding disease progression; in conjunction with associations with predictor variables such as age, gender, degree of vision loss and current treatment regimen. **MATERIAL-METHODS:**Prospective consecutive study using a wet MD patient-reported outcome and experience measure (POEM), modified for an Australian ophthalmic private clinical practice setting. **RESULTS:**One hundred and forty three (M:F 46:97) patients participated in the study. Mean  $\pm$  standard deviation for subject age was  $79 \pm 11$  years. Patients perceived level of understanding of their diagnosis, acceptability of the management plan and side effects, and satisfaction with their health providers was favourable. High variability in responses was observed with respect to perceived worsening of the condition, concerns regarding vision loss and the interference on daily living. Patients with worse visual acuity (B coefficient -4, 95% CI -8 to -1,  $p < 0.02$ ), receiving treatment for a greater duration (B coefficient 2, 95% CI 1 to 3,  $p < 0.001$ ) and current treatment involving intravitreal injections in at least one eye (B coefficient -17, CI 95% -33 to -1,  $p < 0.04$ ) had a greater perceived understanding of their diagnosis. Poorer visual acuity was associated with a greater perception of condition worsening (B coefficient -6, CI 95% -11 to -1,  $p < 0.02$ ) and interference with daily living (B coefficient -8, CI -14 to -2,  $p < 0.01$ ). **CONCLUSIONS:**The modified POEM demonstrates potential to identifying common themes amongst patient subgroups with wet MD, address concerns pertinent to the patient and help optimise health care initiatives and agendas aligned to the patient experience and priorities.

**Keywords:** Patient-reported outcome experience measure, wet macular degeneration, patient-centred care.



POSTER ABSTRACTS

P-009

Focal laser photocoagulation combined with Bevacizumab injections in treatment of aneurysmal type 1 neovascularisation

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**OBJECTIVE:** To report a case of aneurysmal type 1 neovascularisation (AT1N) treated with bilateral intravitreal Bevacizumab injections combined with focal laser photocoagulation.

**MATERIAL-METHODS:** A 58-year-old woman, with no medical history, presented with a progressive visual impairment of the right eye (RE). Visual acuity was limited to counting fingers in the RE and 7/10 in the left eye (LE). Fundus examination showed in the RE serosanguinous maculopathy, druses and orange-red colored protrusions inside and at the margin of the maculopathy. In LE, it showed druses and protrusions under the lower temporal arcade. Multimodal imaging, including Indocyanin green angiography, confirmed the diagnosis of AT1N. The patient was treated with intravitreal Bevacizumab injections (12 in the RE and 3 in the LE) associated with focal laser photocoagulation of extrafoveal polyps.

**RESULTS:** In the RE, final visual acuity was limited to 1/20, fundus ophthalmoscopy showed persistence of hard exudates and SS-OCT showed macular thickness at 260 µm, hyperreflective subfoveal exudates and ellipsoid zone disruptions. In the LE, final visual acuity was at 8/10 and, SS-OCT showed a normal foveal profile without recurrence after 21 months of follow up.

**CONCLUSIONS:** Focal laser photocoagulation should be considered in association with anti-VEGF injections for the treatment of extrafoveal polyps in AT1N. Outcomes depend on the severity of the maculopathy, the number and the location of polyps.

**Keywords:** aneurysmal type 1 neovascularisation, focal laser photocoagulation, intravitreal injection of Bevacizumab



POSTER ABSTRACTS

P-010

**BIO201 represses A2E-induced PPAR transactivation, reduces inflammation, promotes survival of retinal pigment epithelial cells in vitro and rescues retinal phenotype in Abca4<sup>-/-</sup> Rdh8<sup>-/-</sup> mouse in vivo**

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**OBJECTIVE:** Identify the effects and the mode of action of BIO201 (API = norbixin) on retinal pigmented epithelial (RPE) cells in vitro and on retinal function in a murine model of Stargardt/AMD, the Abca4<sup>-/-</sup> Rdh8<sup>-/-</sup> mouse. **MATERIAL-METHODS:** Photoprotection of RPE cells challenged with N-retinylidene-N-retinyl-ethanolamine (A2E) and blue light illumination (470 nm) was quantified by a cell viability assay. Affinity of BIO201 for peroxisome proliferator-activated receptors (PPARs) was determined by competitive binding studies. Transactivation of PPARs, AP-1 and NF- $\kappa$ B were measured using full-length constructs and luciferase reporter genes. Expression of Bcl2 and IL-6 were assessed by western-blot and RT-PCR respectively. A2E and lipofuscin accumulation were evaluated by HPLC-MS/MS and electron microscopy, respectively. Retinal function was measured by electroretinogram (ERG) in Abca4<sup>-/-</sup> Rdh8<sup>-/-</sup> mice. **RESULTS:** BIO201 binds PPAR $\alpha$  and PPAR $\gamma$  (Ki values 16.5 and 1.15  $\mu$ M respectively), but does not transactivate any of the three PPARs. By contrast BIO201 inhibits significantly A2E-induced transactivation of PPARs, AP-1 and NF- $\kappa$ B, and blocks A2E-induced overexpression of IL-6 in RPE cells in vitro suggesting an anti-inflammatory effect. BIO201 also maintains Bcl2 expression decreased by A2E and protects against phototoxicity induced by the association of A2E and blue light illumination (cell survival 80.6% BIO201 vs. 33.6% control (p<0.001)). In vivo 6-month oral supplementation of Abca4<sup>-/-</sup> Rdh8<sup>-/-</sup> mice with BIO201 partially preserves photopic and scotopic A and B wave ERG, reduces photoreceptor degeneration and inhibits lipofuscin and A2E accumulation in RPE. **CONCLUSIONS:** BIO201 inhibits A2E transactivation of PPARs and shows promising effects on RPE cell survival, A2E accumulation and inflammation in vitro. BIO201 also reduces A2E and lipofuscin accumulation in RPE and promotes photoreceptor survival and visual function in Abca4<sup>-/-</sup> Rdh8<sup>-/-</sup> mice in vivo. Therefore, BIO201 offers a new therapeutic option for Stargardt Disease and intermediate AMD both characterized by A2E accumulation.

**Keywords:** BIO201, retinal pigment epithelium, PPARs, Stargardt Disease, dry AMD, inflammation



POSTER ABSTRACTS

P-011

Apatinib, an Inhibitor of Vascular Endothelial Growth Factor Receptor 2, Suppresses Pathological Ocular Neovascularization in Mice

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**OBJECTIVE:** Vascular endothelial growth factor (VEGF) signaling via VEGF receptor 2 (VEGFR2) plays a crucial role in pathological ocular neovascularization. In this study, we investigated the antiangiogenic effect of apatinib, a pharmacological inhibitor of VEGFR2 tyrosine kinase, against oxygen-induced retinopathy (OIR) and laser-induced choroidal neovascularization (CNV) in mice. **MATERIAL-METHODS:** Western blotting and in vitro angiogenesis assays were performed using human retinal microvascular endothelial cells (HRMECs). OIR was induced in neonatal mice by exposure to 75% oxygen from postnatal day (P) 7 to P12 and to room air from P12 to P17. Experimental CNV was induced in mice using laser photocoagulation. Apatinib was intravitreally and orally administered to mice. Neovascularization and phosphorylation of VEGFR2 were evaluated by immunofluorescence staining. **RESULTS:** Apatinib inhibited VEGF-mediated activation of VEGFR2 signaling and substantially reduced VEGF-induced proliferation, migration, and cord formation in HRMECs. A single intravitreal injection of apatinib significantly attenuated retinal or choroidal neovascularization in mice with OIR or laser injury-induced CNV, respectively. Retinal or choroidal tissues of the eyes treated with apatinib exhibited substantially lower phosphorylation of VEGFR2 than those of controls injected with vehicle. Intravitreal injection of apatinib did not cause noticeable ocular toxicity. Moreover, oral administration of apatinib significantly reduced laser-induced CNV in mice. **CONCLUSIONS:** Our study demonstrates that apatinib inhibits pathological ocular neovascularization in mice with OIR or laser-induced CNV. Apatinib may, therefore, be a promising drug for the prevention and treatment of ischemia-induced proliferative retinopathy and neovascular age-related macular degeneration.

**Keywords:** Apatinib, choroidal neovascularization, oxygen-induced retinopathy, receptor tyrosine kinase inhibitor, vascular endothelial growth factor.



POSTER ABSTRACTS

P-012

Intravitreal dexamethasone implant Ozurdex® in naïve patients with diabetic macular edema

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**OBJECTIVE:** This study aimed to evaluate the effect of the intravitreal dexamethasone implant Ozurdex® in patients with DME over a 6-month follow-up period

**MATERIAL-METHODS:** Retrospective and monocentric study including 28 eyes. Inclusion criteria were BCVA less than 75 letters [Early Treatment Diabetic Retinopathy Study (ETDRS) charts] and central macular thickness (CMT)  $\geq 300$   $\mu\text{m}$  secondary to DME. All patients were naïve. Follow-up period was at least 6 months

**RESULTS:** Twenty-eight eyes from 28 patients were included in this study. Mean age was 62.4 years and sex-ratio was 1.33: 1. All patients had type 2 diabetes mellitus and were pseudophakic. Mean BVCA improved from 55 letters at baseline to 80 and 75 at 2 and 6 months of follow-up, respectively. Mean CMT decreased from 493.2  $\mu\text{m}$  at baseline to 284.4  $\mu\text{m}$  (-208.8  $\mu\text{m}$ ) and 296.3  $\mu\text{m}$  (-199.9  $\mu\text{m}$ ) at 2 and 6 months of follow-up, respectively. Ocular hypertension of 26 mmHg was found in a single patient, and was medically controlled. No glaucoma surgery was performed

**CONCLUSIONS:** The intravitreal dexamethasone implant Ozurdex® appears to be an effective long-term alternative for the treatment of diabetic macular edema, especially for pseudophakic patients. Moreover, Ozurdex® improves patient comfort since it requires less intravitreal injections over time comparing to anti-VEGF.

**Keywords:** Intravitreal dexamethasone implant, diabetic macular edema



POSTER ABSTRACTS

P-013

Improvement of visual acuity based on optical coherence tomography patterns following intravitreal bevacizumab treatment in patients with diabetic macular edema

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**OBJECTIVE:** To report the visual outcome based on various patterns of optical coherence tomography (OCT) morphology in diabetic macular edema (DME), following treatment with anti-VEGF intravitreal bevacizumab (IVB) injection.

**MATERIAL-METHODS:** Sixty-seven consecutive subjects with centre involving DME underwent intravitreal injection of Bevacizumab (1.25 mg/0.05 mL) in this retrospective, comparative, non randomized study. The DME was classified into one of four categories: focal, diffuse, focal cystoid and neurosensory detachment based on OCT. Best corrected visual acuity (BCVA), macular appearance, and OCT findings were used to decide whether the subject should have a repeat injection of intravitreal bevacizumab.

**RESULTS:** The mean BCVA improved to logMAR 0.23 at final follow-up from a baseline of 0.32 logMAR ( $P=0.040$ ) in the focal group, logMAR 0.80 at final follow-up from a baseline of 0.82 logMAR ( $P=0.838$ ) in the diffuse group, worsened to logMAR 0.53 at final follow-up from a baseline of 0.43 logMAR ( $P=0.276$ ) in the focal cystoid group, and improved to logMAR 0.79 at final follow-up from a baseline of 0.93 logMAR ( $P=0.490$ ) in the neurosensory detachment group.

**CONCLUSIONS:** OCT morphology patterns in DME may predict the effects of intravitreal bevacizumab treatment, and patients with focal DME are most likely to benefit from the improvement of visual acuity from this treatment.

**Keywords:** OCT, diabetic macular edema, bevacizumab, visual acuity



POSTER ABSTRACTS

P-014

Efficacy and follow-up of anti-VEGF injections in diabetic macular edema (DME) in real-life practice

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**OBJECTIVE:** To evaluate the efficacy and the follow-up of anti-VEGF injections in diabetic macular edema (DME) in real-life practice using the Save Sight Registries (SSR).

**MATERIAL-METHODS:** We conducted an observational, monocentric, retrospective study in the Department of Ophthalmology of the University Hospital of Dijon, that included patients developing a DME between January 2016 and December 2017 with a follow up until December 2018. Demographics and clinicals data, visits, treatments and procedures were entered in the SSR web platform which is a worldwide ophthalmic registry. Primary endpoints were changes in best-corrected visual acuity (BCVA) and central subfield thickness (CST) from baseline to 12 and 24 months. Secondary endpoints were the number of visits and injections and the treatment interval during the follow-up.

**RESULTS:** Seventy-seven eyes of 58 patients with a mean [SD] age of 67.8 [10.1] years were included with a 12 months-follow-up for 47 eyes and 24 months-follow up for 15 eyes. 50 (64.9%) eyes were initiated with aflibercept and 27 (35.0%) eyes with ranibizumab. The mean [95%CI] improvement in BCVA from baseline until month 12 and 24 were +6.3 [+0.1; +12.4] letters and +7.4 [-4.6; +19.6] letters, respectively. The mean [95%CI] decrease in CST from baseline until month 12 and 24 were -92.2 [-138.7; -45.7] and -103 [-178.3; -27.7] micrometers respectively. Per eye, the median [IQR] number of visits was 15 [13.0; 20.0] including 8 [6.0; 10.0] injections with a treatment interval of 40.7 [33.6; 46.8] days during the first year and 22 [17.5; 27.0] visits including 11 [9.0; 16.0] injections with a treatment interval of 46.9 [36.7; 53.3] days during the second year.

**CONCLUSIONS:** This study based on real-life data collection through the SSR in a University Hospital confirmed the efficacy of anti-VEGF injections for DME treatment.

**Keywords:** Intravitreal injection, diabetes mellitus, macular edema





POSTER ABSTRACTS

P-015

Anti-VEGF intravitreal injections in off-label indications overview

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**OBJECTIVE:** Anti-VEGF intravitreal injection (IVI) have several approval in retinal disease focused in precise indications. In daily practice, in case of rare disease, physicians use anti-VEGF injections in off-label indications. Our study aims to make an inventory of anti-VEGF IVIs used off-label and assess their efficacy in each of these indications. **MATERIAL-METHODS:** We have conducted a bicenter, observational, descriptive, and ambispective study. We have collected cases in the ophthalmology department of Avicenne Hospital, Bobigny, and in the Centre d'Imagerie et du Laser, Paris. We enrolled patients who have received IVI of ranibizumab or aflibercept in off-label indications: neovascular glaucoma, macular neovascularization secondary to retinal inflammation, idiopathic choroidal neovascularization in the young patients, exsudation secondary to macular telangiectasia, exsudation secondary to macroaneurysm, rubeosis iridis. Enrollment of patients period run from January 2016 to April 2019.

Primary outcome was best corrected visual acuity (EDTRS scale). Secondary endpoint were added according to the indication: central retinal thickness (RCT), intraocular pressure (IOP), and fundus examination changes. We assessed patients before IVI, at 1 month and at 3 months after IVI.

**RESULTS:** This study enrolled 60 patients from 2 centers. Significant enhancement of the best corrected visual acuity was observed. Regarding the RCT, we observed in the cases of initial increase a significant reduction after injection. In the indication of neovascular glaucoma whatever the cause, we measured a decrease of IOP from 37.5 mmHg to 28.8 mmHg 1 month after injection. In case of iris or pre-retinal neovascularization we observed in most cases a disappearance of the neovascularization after one IVI.

**CONCLUSIONS:** Even in some rare indications, when antiVEGF do not have the approval to be used, physicians have sometimes no choice other than using them in absence of effective therapy. This study shows that despite the lack of approval, antiVEGF are effective in these particular indications.

**Keywords:** antiVEGF, off-label AMM, neovascular glaucoma



POSTER ABSTRACTS

P-016

Retinal Periphery explored by ultra wide field imaging in diabetics patients: a descriptive study

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**OBJECTIVE:**The ultra wide field (UWF) imaging is a new trend in diabetic patients, for screening, diagnosis and classification of the diabetic retinopathy (DR).

A precise knowledge of peripheral lesions seems to be necessary to adjust UWF images to existing classification as ETDRS classification.

The purpose of our study was to describe diabetic and non-diabetic peripherals lesions in UWF imaging outside of the 7 ETDRS fields and to classify their frequency, according to the severity of the DR.

**MATERIAL-METHODS:**Inclusion criteria: diabetics patients of at least 18 years, who had a fluorescein angiography.

Exclusion criteria:panretinal photocoagulation, high myopia, sickle cell retinopathy and retinal vein occlusion.

The severity of the diabetic retinopathy was classified by 2 independent graders on the color UWF images and on UWF fluorescein angiography using the simplified classification of DR.

The ETDRS grid available in the UWF (Optos Advance) software allow us to classify the lesions whether they were inside or outside the grid.

**RESULTS:**On the 136 eyes analyzed of 72 patients enrolled, we found microaneurysms (73%),hemorrhages (35%) and intra retinal microvascular abnormalities (24%) outside of the ETDRS fields with a increased frequency following the severity of the DR.

Peripheral capillary rarefaction,or pseudotelangiectasia or " Coats' like disease" was also found without correlation with the severity of the DR. Their frequency was 28% for mild DR, 21% for moderate DR and 32% for severe DR. We found in a group control of non diabetics patientsa frequency of 15% for thoses lesions.

**CONCLUSIONS:**We found a high frequency of classic diabetics peripheral lesions in UWF imaging. These lesions have a good correlation with current classifications of the DR. We described a new form of peripheral capillary rarefaction which does not seem to be correlated with diabetes or severity of DR.

**Keywords:** ultrawide field diabetic retinopathy pseudotelangiectasia



POSTER ABSTRACTS

P-017

**ULTRA-WIDE FIELD Fluorescein Angiography in SICKLE CELL RETINOPATHY: Correlations Between Peripheral Non-Perfusion Area and Macular Vascular Density on Optical Coherence Tomography Angiography**

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**OBJECTIVE:** In patients with sickle cell retinopathy (SCR), to study correlations between peripheral retinal nonperfusion assessed using ultra-wide field fluorescein angiography (UWF-FA) and the automatically quantified macular vascular densities in the superficial (SCP) and deep capillary plexus (DCP) obtained using optical coherence tomography angiography (OCTA).

**MATERIAL-METHODS:** Prospective, observational study of patients with SCR who underwent a comprehensive ophthalmic examination including UWF-FA (Optos, MA) and OCTA using the AngioVue OCTA system (OptovueRTVue XR 100, CA). Vascular densities in the SCP and DCP, and the area of the FAZ, were measured using the AngioAnalytics software. Ischemic areas were manually selected and the ischemic index (II) was automatically calculated in mm<sup>2</sup> with the Optos Advance software using a correction factor in the peripheral retina.

**RESULTS:** 84 eyes from 42 consecutive patients with SCR were included between June 2017 and March 2018. Mean age was 32.3 years. Twenty-one patients (42 eyes) were SS, 19 patients (38 eyes) were SC and 2 patients were SB0. Mean BCVA was 0,1 LogMAR. The II measured in the peripheral retina on UWF-FA was correlated with the measured FAZ on OCTA (Person,  $r=0.4350$ ,  $p<0.0001$ ), and with the capillary densities of the total SCP (Person,  $r=-0.3974$ ,  $p=0.0002$ ) and of the parafoveal temporal SCP ( $r=-0.3542$ ,  $p=0.0011$ ) on OCTA 3x3. The II was also correlated with the capillary densities of the total DCP ( $r=-0.3344$ ,  $p=0.0021$ ) and of the temporal DCP ( $r=-0.3297$ ,  $p=0.0025$ ) on OCTA 3x3. The correlation also existed on OCTA 6x6. The stages of Goldberg were correlated with the II ( $p=0.0001$ ) and with the capillary densities ( $p=0.0073$ ).

**CONCLUSIONS:** Our study demonstrated a correlation between peripheral nonperfusion on UWF-FA and automatically quantified macular vascular density on OCTA; OCTA could help identify high-risk sickle cell retinopathy patients who may benefit from further evaluation using UWF-FA.

**Keywords:** Sickle cell retinopathy, correlation, non-perfusion area, macular vascular density, ultra-wide field, OCTA.



POSTER ABSTRACTS

P-018

Does Adult-Onset Foveomacular Vitelliform Dystrophy belong to Pattern Dystrophies ?

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**OBJECTIVE:** To investigate putative etiopathogenic relation between Adult-Onset Foveomacular Vitelliform Dystrophy (AFVD) and Pattern Dystrophies (PD)

**MATERIAL-METHODS:** A monocenter French-based cohort of 151 patients (238 eyes with pseudovitelliform macular dystrophy) was investigated for phenotypic characterization based on demographic data, Best Corrected Visual Acuity (BCVA), retinal multimodal imaging including infra-red imaging, spectral-domain OCT, blue-light autofluorescence, subfoveal choroidal thickness, drusen presence. The presence of a choroidal neovascularization was assessed by OCT-angiography and/or fluorescein and indocyanine green angiography. A statistical analysis was performed using Multiple Correspondence Analysis (R Core Team, Vienna, 2017)

**RESULTS:** Mean age of patients was 72 years old. PD was present in 50 eyes of 36 patients (21% of AFVD eyes). No statistical association was described on other demographic or imaging criterions whether pattern dystrophy was present or absent in AFVD patients. On the other hand, a distinct phenotype was shown with variables strongly associated together: the presence of reticular pseudodrusen, a thinner choroid (< 180 µm), a lower visual acuity (0.56 vs 0.2 logMAR) and an older age (83,3 vs 72,0 years old).

**CONCLUSIONS:** Adult onset foveomacular vitelliform dystrophy associated with reticular pseudodrusen may represent a distinct clinical entity. Pattern dystrophy was not statistically correlated with other phenotypic characteristics.

**Keywords:** Vitelliform dystrophy, Genetics, Drusen, Pseudodrusen



POSTER ABSTRACTS

P-019

Multimodal Imaging in Autosomal recessive Bestrophinopathy

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**OBJECTIVE:** Autosomal recessive bestrophinopathy (ARB) is part of the diverse spectrum of retinal diseases caused by mutations in the BEST1 gene. We report the phenotype and multimodal imaging in two families including four patients with ARB.

**MATERIAL-METHODS:** We performed a clinical and multimodal imaging study of four patients with ARB, including color fundus photography, structural OCT, OCT angiography, fundus autofluorescence, global electroretinogram and electrooculogram.

**RESULTS:** Best corrected visual acuity ranged from 2/10 to 6/10. Fundus examination revealed central macular vitelliform lesions with yellow flecks and dots surrounding the arcades and extending into the midperiphery in one patient and diffuse vitelliform deposits with serous retinal detachment in 3 patients. On structural OCT, all patients had intraretinal cysts and diffuse serous retinal detachment. Other ocular complications including choroidal neovascularization and angle closure glaucoma were found in two patients. Electroretinogram showed a moderate reduced response in both scotopic and photopic conditions all patients.

**CONCLUSIONS:** Multimodal imaging may facilitate the diagnosis and follow up of ARB. It helps also to detect retinal complications like CNV. Our Tunisian patients seem to have similar phenotypes to previously reported cases of ARB.

**Keywords:** Multimodal imaging, Bestrophinopathy, choroidal neovascularization



POSTER ABSTRACTS

P-020

Quantification of peripapillary sparing with near infrared autofluorescence predicts the impairment of photoreceptors in patients with Stargardt disease

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**OBJECTIVE:**to evaluate the correlation between the quantification of peripapillary sparing and electroretinography (ERG) outcomes in autosomal recessive Stargardt disease (STGD1)

**MATERIAL-METHODS:**Near infrared fundus autofluorescence (NIR-FAF) images of 101 eyes of 101 patients were retrospectively reviewed. Peripapillary sparing was assessed both qualitatively and quantitatively. The area of spared tissue (AST) was calculated in a 1-mm wide ring around the optic disc after binarization of the 55° NIR-FAF. These measurements were correlated with the presence of normal ERG (group I), altered photopic responses (group II) or altered photopic and scotopic responses (group III).

**RESULTS:**AST showed significant correlations with ERG groups ( $R = -0.802$ ,  $p < 0.001$ ). While qualitative assessment of peripapillary sparing (i.e., present or not) also showed a significant correlation with ERG groups ( $R = -0.435$ ,  $p < 0.001$ ), it was weaker than by AST quantification. The ordinal regression analysis showed that the increase in AST was associated with a decrease in the odds of belonging to ERG group II and III, with an odds ratio of 0.82 (95% CI, 0.78 to 0.87),  $p < 0.001$ .

**CONCLUSIONS:**The AST around the optic disc in eyes with STGD1 correlates with the impairment of photoreceptors as assessed by ERG. If replicated in future longitudinal studies, the quantification of peripapillary sparing may prove to be a useful parameter for evaluating the visual prognosis of these eyes.

**Keywords:** Stargardt disease, near-infrared autofluorescence, peripapillary sparing, electrophysiology.



POSTER ABSTRACTS

P-021

Incontinentia Pigmenti (IP): A case of homozygous twins with highly asymmetric ophthalmologic involvement

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**OBJECTIVE:**Incontinentia Pigmenti (IP) is a rare multisystem ectodermal dysplasia with a X-linked dominant transmission, usually lethal in boys. Manifestations of the disease include skin lesions, central nervous system manifestations, dentals and eye involvement. Ocular lesions affect mostly the retina such as ischemic peripheral damage with neovascularization, usually described as unilateral. We report a case of unequal ophthalmological penetrance involvement of two 7-month-old homozygous females twins. **MATERIAL-METHODS:**Clinical history of both patients will be exposed. Fundus photographic iconography and fluorescein angiography will illustrate ophthalmological involvement. Therapeutic options will also be discussed. **RESULTS:**We report the case of two 7-month-old homozygous females twins born prematurely at 34 weeks. Both presented typical linear vesicular skin lesions at birth and positive genetic testing for IP. Slit lamp examination and IOP were normal. Fundus examination of twin A showed a total retinal detachment in the left eye. Contralateral eye presented a large temporal ischemic area confirmed at fluorescein angiography and complicated by a "sea fan" neovessel. Twin B fundus examination and fluorescein angiography were normal in both eyes.

**CONCLUSIONS:**This case illustrates variable ophthalmic involvements of IP in homozygous twins and suggests inconsistent ophthalmic lesions, including for the same mutation. This phenotypic inequality could be explained by random inactivation of the X-chromosome in the late blastocyst. Early identification of this rare disease is essential for optimal management.

**Keywords:** Incontinentia Pigmenti, retinal detachment, proliferative retinopathy, ectodermal dysplasia



POSTER ABSTRACTS

P-022

Ellipsoid zone changes and foveal thickness following subretinal gene therapy with voretigene neparvovec

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**OBJECTIVE:** Voretigene neparvovec is approved for treatment of RPE65 mutation-associated retinal dystrophy, and is the first US Food and Drug Administration-approved gene therapy for any inherited disease. This study describes ellipsoid zone (EZ) line and foveal thickness changes following subretinal injection of voretigene neparvovec. **MATERIAL-METHODS:** OCT imaging (Heidelberg Spectralis) was performed prior to and following subretinal injection. The central subfield thickness (500 micron diameter) and central minimum thickness (i.e. foveal thickness) were measured. Changes in EZ line morphology were evaluated qualitatively. These data were compared to changes in visual acuity and light sensitivity thresholds. **RESULTS:** Six of 8 eyes had gradable images. 1 eye had loss and return of EZ to baseline, 3 of 6 eyes (2 patients) had loss of EZ and then partial recovery, 1 eye had loss of EZ, and 1 of 6 had a stable attenuated EZ. All eyes with initial loss of EZ had it first occur at the first post-operative imaging of attached retina. Both eyes with loss and return of EZ showed the improvement at post-operative month 1. One eye showed an increase in foveal thickness (+72 microns). The remaining 5 eyes all showed mild thinning with a mean of  $-27 \pm 20$  microns. EZ loss and thickness changed were not clearly correlated with visual acuity changes in this small sample. All patients demonstrated improvement in light sensitivity threshold and reported improvement in vision. **CONCLUSIONS:** Changes in EZ line morphology and in foveal thickness are variable following subretinal injection of voretigene neparvovec. All eyes with EZ loss including those with return of EZ to baseline had EZ loss occur at post-operative week 1. Further, EZ recovery, when present, occurred at month 1. These observations are a basis for further study to correlate structural changes after subretinal injection of voretigene with changes in vision.

**Keywords:** Gene therapy, Retinal Degenerations





POSTER ABSTRACTS

P-023

Sensitivity and specificity of ultra-widefield fundus photography versus ultra-widefield fluorescein angiography for staging of sickle cell retinopathy in real-life practice

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**OBJECTIVE:** To evaluate the diagnostic accuracy of ultra-wide-field retinophotography (UW-RP) versus ultra-wide-field fluorescein angiography (UW-FA) for the detection and classification of sickle cell retinopathy in real-life practice and by ophthalmologists various degrees of expertise in retinal pathologies.

**MATERIAL-METHODS:** This is a retrospective observational study including sickle cell patients referred for ophthalmic examination in the ophthalmic department. A comprehensive ophthalmic examination, including UW-RP and UW-AF (OPTOS PLC, Dunfermlin, Scotland, UK) was performed in all patients. The UW-RP and UW-FA images have been independently classified according to Goldberg's classification by ophthalmologists of different levels of expertise. The concordance measurements were determined by the Bland-Altman method. The sensitivity and specificity of UW-RP were calculated separately for the trainees and experienced ophthalmologists.

**RESULTS:** 67 eyes of 34 sickle cell patients were included, including 20 patients with SS Sickle Cell Disease, 12 patients with SC Sickle Cell Disease and 2 patients with S-beta-thalassemia. The sensitivity of UW-RP for the diagnosis and classification of sickle cell retinopathy was 72, 52% for evaluator 1 and 63.80% for evaluator 2. The specificity of UW-RP was 70% for Evaluator 1 and 71, 43% for Evaluator 2. The bias between the Apprenticeship and Expert Rankings was  $0.06 \pm 0.14$  on UW-RP and  $0.03 \pm 0.09$  on UW-FA. **CONCLUSIONS:** Although UW-RP has a relatively good sensitivity and specificity for the detection and staging of SCR, UW-FA remains an essential examination for the diagnosis and monitoring of sickle cell patients with a significantly higher sensitivity and specificity to detect the different stages of sickle cell retinopathy.

**Keywords:** sickle cell disease, Goldberg classification, ultra-widefield imaging, angiography



POSTER ABSTRACTS

P-024

Inner Retinal Remodeling in Retinitis Pigmentosa: Correlation Among Microvascular Changes, Macular Function and Retinal Structure

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**OBJECTIVE:** To analyze structural and microvascular changes in patients with retinitis pigmentosa (RP) with relatively preserved visual acuity (VA) using Swept Source OCT and optical coherence tomography angiography (OCT-A) and to correlate results to macular function.

**MATERIAL-METHODS:** Seventy eyes of 35 RP patients with relatively preserved VA were enrolled in our study. All patients underwent a complete ophthalmic examination, including Swept source OCT, OCT-A. Main outcome measures were ellipsoid width and ganglion cell complex (GCC) thickness in OCT and vascular flow densities (VFD) in the fovea and the parafoveal in the superficial (SCP) and deep (DCP) plexi in OCT-A. Thirty-four age- and axial length-matched healthy eyes (control group) were also analysed.

**RESULTS:** GCC thickness was  $72.86 \mu\text{m} \pm 2$  in RP patients and  $108 \mu\text{m} \pm 5.3$  in controls, and were significantly lower in RP patients ( $P < 0.0001$ ).

In the RP group, parafoveal VFD was  $25.99 \pm 5.2\%$  in the SCP and  $34.47 \pm 2.37\%$  in the DCP and were significantly lower compared to control group ( $p < 0.0001$ ;  $p = 0.0026$  respectively).

We found a significant correlation between parafoveal DCP density and the width of ellipsoid band in both univariate ( $p = 0.041$ ) and multivariate study ( $p < 0.0001$ ).

The superficial parafoveal VFD was significantly correlated to GCL thickness in both univariate ( $p = 0.033$ ) and multivariate analysis ( $p = 0.005$ ).

Using multivariate analysis, we found that GCC thickness was the factor associated with VA ( $p = 0.011$ ,  $\beta = 0.320$ , CI [0.30-2.22]).

**CONCLUSIONS:** Significant alterations and atrophy of the retinal vascular network occur in RP at an early stage of the disease. Decreased parafoveal VFD in DCP may be responsible for progressive shortening of the ellipsoid band while decreased parafoveal VFD in SCP may be responsible for GCC thinning and for remodeling of the inner retina. VA may decrease not only as a result of photoreceptors loss but also secondary to loss of GCC.

**Keywords:** retinitis pigmentosa, microvascular changes, ganglion cell complex thickness, OCT angiography



POSTER ABSTRACTS

P-025

Homozygous mutation in ABCA4 associated with cone rod dystrophy in a patient with Turner syndrome

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**OBJECTIVE:** We report the phenotypic characteristics and genetic resultants in a twelve years old girl with Turner syndrome.

**MATERIAL-METHODS:** case report

**RESULTS:** It is a 12 year-old female that consulted for progressive visual loss and poor night vision. She did not report any pathological or ophthalmological history in the family nor parental consanguinity. The general examination was normal except for a short stature (-3 SD). The best corrected visual acuity was 1/20 in both eyes. Anterior segment and intraocular pressure were normal. The eye fundus examination showed pallor of the optic disc, attenuated retinal vessels, peripheral bone spiculed pigmentations and an epimacular membrane. The OCT confirmed the presence of membrane and showed alteration of ellipsoid zone. ERG showed decreased photopic and scotopic responses, attesting the damage of both cones and rods. The karyotype of blood showed monosomy 45,X. Cardiovascular examination revealed aortic coarctation. Pelvic ultrasound showed an infantile uterus. The ovaries were not visible. WES analysis identified a known ABCA4 (c.885delC) deletion, resulting in a frameshift and a termination codon at position p.L296Cfs\*4. This mutation was homozygous in the affected child and was heterozygous in the unaffected mother. In addition, mutations in RPGR ORF15 were excluded.

**CONCLUSIONS:** Several ocular disorders are associated with Turner syndrome, including amblyopia, strabismus, ametropia, ptosis, nystagmus, hypertelorism, palpebral fissures, red-green deficiency, congenital glaucoma and blue sclera. Four cases of Turner syndrome with retinitis pigmentosa have been reported in the literature, whose three without molecular genetic confirmation. The fourth case was that of a 28-year-old patient in which genetic analysis showed a novel mutation in the RPGR gene on X chromosome. We hypothesize that CRD in this girl is not related to Turner syndrome, but may be a manifestation of the lack of a normal X chromosome with ABCA4 mutation especially since our patient phenotype is not characteristic of ABCA4 mutation.

**Keywords:** Turner syndrome, cone rod dystrophy, ABCA4



POSTER ABSTRACTS

P-026

Circumferential Subretinal Fibrosis Associated with Recessive NR2E3 Mutation p.R311Q

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**OBJECTIVE:**Our aim was to describe a unique pattern of circumferential subretinal fibrosis associated with recessive NR2E3 mutation in a Tunisian consanguineous family and to expand the clinical spectrum of enhanced S-cone syndrome (ESCS) due to mutations in this gene

**MATERIAL-METHODS:**We performed a clinical and molecular study of a consanguineous Tunisian family with two patients affected with circumferential subretinal fibrosis. DNA sample from the index patient was subjected to whole exome sequencing (WES). Variants localized in homozygous regions were validated by Sanger sequencing. Familial segregation was performed

**RESULTS:**The index patient was 52 years old and reported visual loss and photophobia from the second decade of life. Visual acuity was limited to 2/10 RE and 4/10 LE. Fundus examination revealed symmetric circumferential fibrosis in the posterior pole, with hyperpigmentation and sparing of the fovea. Based on swept source optical coherence tomography images of the central area, the fibroses appeared to be located subretinally and associated with diffuse intra-retinal cysts. His child aged 13 years old had similar phenotype. Fullfield ERG showed similar waveforms in scotopic and photopic responses. Mutation analysis in our patient revealed known homozygous missense mutation p.[R311Q];[R311Q] in NR2E3 (NM\_014249.3).

**CONCLUSIONS:**Our report documents circumferential subretinal fibrosis as another potential phenotypic manifestation of recessive NR2E3 mutation. As in inflammatory diseases, fibrosis may have been a reactive response from the retinal pigment epithelium, the level at which the typical nummular deposits of ESCS occur

**Keywords:** Circumferential subretinal fibrosis; enhanced S-cone syndrome, phenotype-genotype



POSTER ABSTRACTS

P-027

Comparison of ultra wide field angiography to the 7 classic fields in the screening, follow-up and classification of proliferative sickle cell retinopathy

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**OBJECTIVE:**To date, there is no gold standard exam for the screening, classification and follow-up of sickle cell retinopathy. However, for diabetic retinopathy, the reference is the 7 ETDRS fields photographs. We performed a mono center observational cross-sectional study to compare ultra-wide field angiography to 7 ETDRS fields in patients presenting or screened for sickle cell retinopathy(SCR). **MATERIAL-METHODS:**59 eyes of 30 patients, who had underwent Ultra-wide-field (UWF) angiography (Optos ©, Optos Inc., Scotland) for screening or follow-up between September 2016 and April 2018, were included. Ultra-wide-field were interpreted and then another analysis was made by superimposing the ETDRS grid (software Optos ©) over the UWF retinography. The stage of sickle cell retinopathy was defined for each case using **RESULTS:**After UWF images analysis, 96.6% of the eyes assessed had sickle cell retinopathy: 47.5% stage 2, and 49.1% stage 3. 52 eyes (88.1%) showed differences between the UWF and the ETDRS 7 snapshots. Among these 52 images, 46.2% were qualified as stage 2 sickle cell retinopathy in UWF but normal in the 7 ETDRS fields and 32.7% were qualified as stage 3 in UWF but normal on the 7 ETDRS fields. Thus, 41 out of 59 (69.5%) of the cases had UWF (stage 2 or 3) sickle cell retinopathy that was not diagnosed with the 7 ETDRS fields. 24 eyes categorized as "stage 3 retinopathy" in UWF (82.7%) were not diagnosed with ETDRS images. **CONCLUSIONS:**This study showed the clear superiority of the ultra-wide field imaging technique in the screening and classification of proliferative sickle cell retinopathy compared to the 7 ETDRS fields.

**Keywords:** Sickle cell retinopathy, ultra wide filde



POSTER ABSTRACTS

P-028

Incidence of acute postoperative endophthalmitis following macular surgery in France between 2006 and 2016

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**OBJECTIVE:**To report the incidence of acute postoperative endophthalmitis (POE) after macular surgery in France between 2006 and 2016 and to identify associated factors.

**MATERIAL-METHODS:**We conducted a nationwide population-based retrospective cohort study over an 11-year period. Our population included all hospital discharge abstracts involving a surgical procedure for an epiretinal membrane or a macular hole in France from January 2006 to October 2016. Acute POE was identified by two codes in the 10th edition of the International Classification of Diseases within 42 days after a macular surgical procedure. We calculated the incidence of acute POE. We used Poisson regression to assess associations with time periods, demographic and clinical factors.

**RESULTS:**In France, 152,034 macular surgical procedures for epiretinal membranes or macular holes were recorded from January, 1st, 2006 to October, 31st, 2016. Acute POE was reported in 381 cases. The incidence of POE was 0.25% overall, 0.30% for epiretinal membrane surgery and 0.14% for macular hole surgery. The incidence of POE was the highest for both procedures in 2010 and 2011 (0.32% and 0.29%, respectively). In multivariable Poisson regression analysis, epiretinal membrane surgery was associated with POE (incidence rate ratio, 2.24; 95% CI, 1.62–3.11; P <.001). For epiretinal membrane surgery, the 2010–2011 period was significantly associated with a higher risk of POE (incidence rate ratio, 1.66; 95% CI, 1.13–2.42; P =.03).

**CONCLUSIONS:**The incidence of POE after macular surgery was 0.25% overall in France between 2006 and 2016 and twice higher for epiretinal membrane surgery than for macular hole surgery. For epiretinal surgery only, the incidence of POE was higher in 2010–2011 (period of the switch to transconjunctival vitrectomy) than in the rest of the study period.

**Keywords:** endophthalmitis, macular surgery, epiretinal membrane, macular hole, transconjunctival sutureless vitrectomy, epidemiology



POSTER ABSTRACTS

P-029

Autologous lens capsular flap transplantation for persistent macular holes

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**OBJECTIVE:**To analyze the anatomical and functional results after autologous lens capsular transplantation technique for persistent macular holes.

**MATERIAL-METHODS:**A retrospective observational study of 5 eyes of 5 patients treated with vitrectomy with autologous lens capsular flap transplantation. Complete ophthalmic examination was performed preoperatively and at 7 days, 1, 3, 6 months after surgery.

**RESULTS:**Successful macular hole closure was achieved in all patients. The mean minimum diameter before the surgery was 678.7  $\mu\text{m}$ , and mean basal diameter 1064.2  $\mu\text{m}$ . Mean preoperative visual acuity before the transplantation of the lens capsule flaps was 20/250, while after surgery it was 20/100.

**CONCLUSIONS:**Autologous lens capsular flap transplantation is a potential alternative treatment for patients with large persistent macular hole where the operative techniques used earlier have failed.

**Keywords:** lens capsular transplantation, macular hole, vitrectomy



POSTER ABSTRACTS

P-030

Residual macular subretinal fluid after rhegmatogenous retinal detachment surgery treated with micropulse laser

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**OBJECTIVE:** To investigate the effect of micropulse laser (MPL) in the treatment of residual macular subretinal fluid (SRF) after rhegmatogenous retinal detachment (RRD) surgery.

**MATERIAL-METHODS:** Patient presenting residual SRF after episcleral RRD surgery treated with MPL (Iridex IQ 577 nm). Swept source optical coherence tomography (OCT) and fundus autofluorescence (FAF) were performed before and after treatment.

**RESULTS:** Thirty-eight-year-old male patient with history of RRD treated with cryotherapy and scleral buckling. Six months after surgery, residual macular SRF was still present. Best-corrected visual acuity (BCVA) was 0.05 and structural B-Scan OCT showed substantial SRF accumulation. Central macular thickness (CMT) was 280 µm. We performed 3x3 macular grid with MPL (high-density, no spacing application of 125 impacts, spot size = 200 µm, wavelength = 532 nm, duty cycle = 5%, exposure duration = 0.2 seconds, power titration = 450 mW). After 8 weeks, BCVA was stable (0.05). OCT showed reduction of SRD (CMT = 204 µm) and FAF did not show any macular scar. We performed a second macular grid. After 8 more weeks, patient reported a visual improvement and BCVA was 0.1. OCT showed near-complete resolution with persistent trace SRF and CMF was 109 µm.

**CONCLUSIONS:** Macular micropulse laser could be an efficient treatment for residual SRF after RDD surgery. MPL effect seems to be delayed and close follow up is necessary. A larger series of patients is required for the validity of the conclusion.

**Keywords:** Micropulse laser, residual subretinal fluid, retinal detachment





POSTER ABSTRACTS

P-031

Two-year experience with Argus II retinal prosthesis in France: safety, postoperative anatomical findings, functional performances and satisfaction

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**OBJECTIVE:** To report the two-year safety and functional performances of Argus II retinal prosthesis in a cohort of French patients with end-stage retinitis pigmentosa, and further describe post-operative finding concerning the positioning of the array and its evolution over time.

**MATERIAL-METHODS:** Eighteen consecutive patients with end-stage retinitis pigmentosa were enrolled in this single-arm prospective multicenter clinical trial. Surgical procedure was adapted to lower postoperative risks of hypotony and/or corneo-scleral erosion. Intraoperative and postoperative data at day 1, weeks 1 and 2, months 1, 3, 6, 12, 18 and 24 were collected. Postoperative distance between electrode-array and retina was measured on SD-OCT images. Position of the array was evaluated on fundus images during follow-up. Visual performances were evaluated using square localization and direction of motion tests with the system alternatively turned ON or OFF. Satisfaction and quality of life of implanted patients were assessed using the FLORA® questionnaire.

**RESULTS:** The adapted surgical technique was performed easily without associated specific complications. No cases of chronic hypotony or conjunctivo-scleral erosion were reported. Postoperative distance between array and retina was variable. A statistically significant slight rotation of the array was observed over time. Visual function tests showed better results for square localization and grating acuity tests when the system was turned ON compared to OFF. No significant differences were noted for direction of motion tests. At 24 months 53% of implanted patients were satisfied with the system and only 18% were dissatisfied.

**CONCLUSIONS:** The adapted surgical technique was easily achieved and effective in preventing hypotony and conjunctival erosion. Postoperative distance between array and retinal surface was variable, and increased in case of preoperative staphyloma. A slight rotation of the device occurred over time. Visual tests and satisfaction questionnaire demonstrated that the Argus II system can improve functional performances and produce a recognizable positive impact on patients' quality of life.

**Keywords:** Argus II, retinitis pigmentosa,



POSTER ABSTRACTS

P-032

Laser treatment for serous retinal detachment complicating papillary coloboma

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**OBJECTIVE:**To report the case of a patient with reduced visual acuity in relation to serous macular detachment complicating papillary coloboma which was treated by laser.

**MATERIAL-METHODS:**A single case report

**RESULTS:**A 16-year-old girl presented for refraction control. The ophthalmic examination found on the right side a best corrected visual acuity at 20/20, there were no signs of anterior segment inflammation and the eye fundus was normal. On the left side the best corrected visual acuity was at 20/100. Anterior segment examination was unremarkable and there was no relative afferent pupillary defect. Fundus examination revealed a papillary coloboma and a lower chorioretinal coloboma. Swept-source optical coherence tomography showed a serous macular detachment. Magnetic resonance imaging was requested to search for other brain defects associated with this ocular malformation. Juxtapapillary argon laser photocoagulation was performed in the temporal side of the optic disc. Three month later, visual acuity improved to 20/63 with partial resolution of the subretinal fluid.

**CONCLUSIONS:**Papillary coloboma is a rare congenital malformation of the optic disc prone to complications such as serous macular detachment. The provenance of the submacular fluid is discussed explaining the lack of therapeutic consensus. Therapeutic options vary between gas injection and peripapillary photocoagulation alone or associated with vitrectomy. Optical coherence tomography remains an essential tool in diagnosing and monitoring of these patients.

**Keywords:** papillary coloboma, serous retinal detachment, laser



POSTER ABSTRACTS

P-033

Optical coherence tomography angiography changes in myopic choroidal neovascularization after anti-vascular endothelial growth factor treatment

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**OBJECTIVE:** To investigate the morphologic changes on optical coherence tomography angiography (OCTA) of choroidal neovascularization (CNV) secondary to high myopia after 2 years of anti-vascular endothelial growth factor therapy (ranibizumab).

**MATERIAL-METHODS:** Consecutive highly myopic patients complicated with active myopic choroidal neovascularization were retrospectively included. All patients underwent fundus examination, fluorescein angiography, structural spectral domain OCT, and OCTA Optovue RTVue XR Avanti (Optovue) at baseline, and repeated OCTA and structural spectral domain OCT over a 24-month period. Qualitative analysis of the 3 × 3 OCTA examinations at baseline and Month 24 was then compared, to assess changes after anti-vascular endothelial growth factor therapy.

**RESULTS:** Eighteen eyes of 18 patients (mean age  $59.6 \pm 12.1$  years), presenting with both treatment-naïve and recurrent were included in the analysis. They received a mean number of 5.32 injections over 24 months. The mean difference in best-corrected visual acuity (BCVA) from baseline to the last follow-up was  $+14 \pm 12.7$  ETDRS letters ( $p = 0.004$ ). At baseline, two neovascular phenotypes prevailed in our series: disorganized vascular loops (38.9% of eyes) and organized interlacing patterns (61.1% of eyes). The mean vessel area was of 0.22 mm<sup>2</sup> and significantly decreased to 0.11 mm<sup>2</sup>. At 24 months, abnormal blood flow was detected in 13 eyes. Eyes with complete regression were presented with disorganized vascular loops pattern at baseline.

**CONCLUSIONS:** Combined with OCT B-scan, OCT angiography could provide quantitative analysis for monitoring and evaluating the therapeutic effect of intravitreal anti-vascular endothelial growth factor for myopic CNV.

**Keywords:** myopic choroidal neovascularization, optical coherence tomography angiography, anti-vascular endothelial growth factor treatment



POSTER ABSTRACTS

P-034

**OCT and OCT-Angiography in choroidal neovascularization secondary to high myopia: a case series**

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**OBJECTIVE:**To describe the clinical and tomographic features of choroidal neovascularization (CNV) complicating high myopia and its response to intravitreal anti-VEGF injections.

**MATERIAL-METHODS:**It was a retrospective study of high myopic eyes with CNV. All patients underwent a complete ophthalmic examination, fluorescein angiography (FA) and swept source optical coherence tomography (SS-OCT). Optical coherence tomography angiography (OCTA) was realized when possible. An intravitreal anti-VEGF injection was administrated followed by a monthly SS-OCT and OCTA. The OCTA features were analyzed and correlated with the findings of conventional imaging (FA and SS-OCT). Retreatment with anti-VEGF was indicated in case of persistent signs of OCT retinal exudation and/or leakage on FA and on the OCTA vascular patterns.

**RESULTS:**Fifteen eyes of 15 patients were assessed (mean age: 46 years, mean refractive error: -12 diopters, mean visual acuity: 1/20). Fundus examination revealed a macular hemorrhage in 10 eyes. FA showed a macular hyperfluorescence with late dye diffusion, while in SS-OCT an intraretinal exudation was noted in all cases. OCTA showed the CNV with disorganized vascular loops and branching interlacing patterns. The mean number of intravitreal anti VEGF injections was 2 during a 23 months follow up period. The mean final visual acuity was 5/20. The patterns of CNV on OCTA changed through the treatment parallel to the decreasing of exudation signs on SS-OCT. The mean final visual acuity was 2.5/10.

**CONCLUSIONS:**OCT and OCTA are valuable imaging tools for the detection and follow-up of myopic CNV after intravitreal anti VEGF injections. FA can be still necessary for detection of myopic CNV in cases of poor visualization on OCTA and for follow-up when signs of exudation are poor or absent. Although there is an anatomical response of myopic CNV to intravitreal injections of anti-VEGF, functional results remain variable.

**Keywords:** choroidal neovascularization, high myopia, optical coherence tomography angiography



POSTER ABSTRACTS

P-035

Outcomes of 5 years of intravitreal ranibizumab (IVR) for myopic choroidal neovascularization (mCNV)

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*SEL Dr BOULET JF*

**OBJECTIVE:**Analyzing the medical records of 28 eyes of 28 consecutive patients with myopic CNV who had been treated with IVR with a minimum follow-up period of 6 months after the initial IVR injection. The factors that predicted the best-corrected visual acuity (BCVA) at 5 years after IVR are calculated using mixed models. **MATERIAL-METHODS:**Retrospective, monocentric, non-randomized study.

Data collected are of the visual acuity, the number of IVRs, the number of visits, every 6 months, during the first year, then every year for 5 years. At each visit, optical coherence tomography (OCT) type B or A data are collected.

**RESULTS:**At baseline, 20 women and 8 men are presents. Mean age is 69 (+/-14) years old, with a mean refractive error of -8.00 (+/-6) diopters. Mean best corrected visual acuity (BCVA) are 0.504, 0.296, 0.349, 0.375, 0.426, 0.482 Log MAR, at baseline, first, second, third, fourth, five years, respectively. The initial benefit decrease with time from the second year ( $p=0.396$ ). Mean number of IVR is 3 (+/- 3.5). The number of IVR don't explain BCVA at 5 years ( $p=0.240$ ). There is no interaction between time and realization of a dynamic phototherapy. (PDT) ( $p=0.270$ ). There is no interaction between performing prior cataract surgery and time to explain BCVA at 5 years. At baseline, and at each of the 5 years, respectively, 25%, 58%, 57%, 44%, 50%, 43% have a BCVA more than 20/40. Fibrosis is observed in 37.5 % of cases. The average number of visits is 14 (+/-11) with a range of 1-50. Features of OCT-A are a tangle net or a tapered net. **CONCLUSIONS:**Treatment with anti-VEGF helps to maintain an improvement in visual acuity during the first year. More biomarkers should be studied to evaluate final visual acuity.

**Keywords:** Myopia, neovascularization, ranibizumab, OCTB, OCTA



POSTER ABSTRACTS

P-036

**Aneurysmal type 1 neovascularization in myopic staphyloma**

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**OBJECTIVE:**To report a case of aneurysmal type 1 neovascularization associated to myopic staphyloma.  
**MATERIAL-METHODS:**Case report of myopic patient complaining about metamorphopsia in his right eye. Fundus examination, colour fundus photography, fluorescein angiography, indocyanine green angiography (ICGA) and swept source optical coherence tomography (OCT) and angiography (OCTA) were performed.  
**RESULTS:**Seventy-three-year-old caucasian male patient with high myopia (axial length = 27.24 mm). Best-corrected visual acuity was 0.8 with paracentral scotoma. Fundus examination showed myopic conus and deep diffuse haemorrhage temporal and superior to the macula, sparing the fovea. A deep orange-brownish nodular lesion (size =  $\frac{1}{4}$  disk diameter) was visible, superior to the macula, at the edge of the haemorrhage and connected to a large choroidal vessel. ICGA showed multiple hyperfluorescent spots arising from choroidal circulation in the early phase and a bigger circular hyperfluorescent lesion in mid-phase, without a branching vascular network. Swept source structural B-scan OCT showed preservation of the foveolar depression and a thin sub-foveal choroid (75  $\mu$ m), associated to a large pigment epithelium detachment (PED), temporal to the fovea with sub-epithelial hyperreflectivity (haemorrhage). At the level of the polypoidal lesion, OCT showed a high bilobed PED, without subretinal fluid. We observed abrupt change in the choroidal thickness, from 62  $\mu$ m in the peripapillary area to 120  $\mu$ m underneath the polypoidal lesion, with dilated choroidal vessels. OCTA could detect a small circular hyper-signal lesion in the outer retina slab, connected to a deep hypersignal vessel, with a shadowing in the choriocapillaris slab.

**CONCLUSIONS:**Aneurysmal type 1 neovascular lesions can occur in myopic staphyloma. Areas of abrupt choroidal thickening relative to the surrounding thinned choroid were observed in our case and would explain the development of polypoidal lesion. Swept source OCT is a precious tool in choroidal imaging and combined OCTA can detect polypoidal lesion non-invasively.

**Keywords:** polyps, aneurysmal type 1 neovascularization, myopic staphyloma, high myopia



POSTER ABSTRACTS

P-037

High myopia with macular retinal detachment caused by colobomatous pit of the optic nerve papilla

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**OBJECTIVE:**The colobomatous pits of the optic nerve papilla is a congenital anomaly of the optic nerve head that is related to a lack of closure of the embryonic cleft, which may cause retinal detachment of the macular region, retinal imaging provided new information on the pathophysiology of the disease How to make the diagnosis of this pathology, what is the therapeutics and prognosis ?

**MATERIAL-METHODS:**CASE: 65-year-old female patient, with high myopia, who reports a progressive decrease in visual acuity for 2 years, with OD: 5/10 P3, OS: 7/10 P2, Normal anterior segment, clear crystalline, chorioretinal atrophy, with doubt on a temporal retinal detachment in temporal field on the right eye OCT OD: temporal serous retinal detachment, epiretinal membrane, interpapillomacular schisis, colobomatous pits of the optic nerve papilla, dome-shaped macula

**RESULTS:**The management of maculopathy due the colobomatous pits of the optic nerve papilla is difficult because of the scarcity of studies analyzing the therapeutic results. Although spontaneous resolution has been postponed, management involves surgical approaches because the prognosis depends on the precocity of the surgical procedure. According to some authors, the treatment of choice of retinal serous detachment secondary to the colobomatous fossa is vitrectomy with gas tamponade with laser photocoagulation, Relapses are common, leading to irreversible damage to the pigment epithelium

**CONCLUSIONS:**Although the retinal serous detachment due to the colobomatous pits of the optic nerve papilla is rare, the ophthalmologist must think about it and carry the diagnosis. There are few studies on this pathology, the majority of which are case reports and small series without comparative studies, that makes the managing of this pathology a real challenge.

**Keywords:** colobomatous pits of the optic nerve papilla, retinal detachment,



POSTER ABSTRACTS

P-038

Optical Coherence Tomography Angiography of Choroidal Neovascularization Secondary to High Myopia

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**OBJECTIVE:**We aim to describe the morphological features of choroidal neovascularisation (CNV) and to report the ability of optical coherence tomography angiography (OCT-A) to detect the presence of myopic CNV. **MATERIAL-METHODS:**Myopic CNV cases were individuated from a pool of patients with pathological myopia ( $> 6$  diopters and  $> 26$  mm axial length) presenting between June 2014 and April 2019. All patients underwent an ophthalmologic evaluation including visual acuity testing, a detailed slit lamp examination after mydriasis, fundus fluorescein angiography (FFA), Optical Coherence Tomography Spectral Domain (OCT-SD) and optical coherence tomography angiography (OCT-A). OCT-A images were assessed for classification of morphological features, and to estimate sensitivity and specificity. **RESULTS:**Thirty-eight eyes of 28 consecutive patients with myopic CNV were included. In 6 out of 38 eyes it was not possible to classify the CNV 'shape', 'core', 'margin' and 'appearance' because the vascular network was not clearly visualised due to the poor quality of the examination. CNV shape on OCT-A was rated as circular in 12 eyes and irregular in 20 eyes. CNV core was visible in 11 eyes. CNV margin was considered as well defined in 12 eyes and poorly defined in 20 eyes. CNV appearance showed an 'interlacing' aspect in 12 eyes and a 'tangled' aspect in the other 14 eyes. A total of 11 CNVs were defined as active, 9 of which were interlacing, while a total of 21 were inactive, 14 of which were tangled. **CONCLUSIONS:**OCT-A seems to be a valuable tool in detecting and evaluating myopic CNV with a high sensitivity. However, its specificity needs to be investigated in further studies.

**Keywords:** Optical Coherence Tomography Angiography, Choroidal Neovascularization, High Myopia





POSTER ABSTRACTS

P-039

Quantitative analysis of the retinal capillary plexa and choriocapillaris in sickle cell disease (SCD) imaged with optical coherence tomography angiography (OCTA)

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**OBJECTIVE:** To analyze the vascular density (VD) and fractal dimension (FD) of the superficial capillary plexus (SCP) and the deep capillary plexus (DCP) in patients with SCD imaged with OCTA and to compare the findings according to their genotype. **MATERIAL-METHODS:** Consecutive patients referred for ophthalmological examination in the context of SCD were prospectively included between November 2017 and October 2018. Patients underwent a complete ophthalmological examination, including 3x3 mm OCTA. VD of the SCP and DCP were computed using ImageJ software (NIH, Bethesda, Maryland, USA). Skeletonized images were used for computing FD using Fractalyse (ThéMA) software. **RESULTS:** One hundred and ten eyes of 57 patients, of which 50 eyes (51.81%) with HbSS SCD, 45 eyes (40.90%) with HbSC SCD and 15 eyes (13.63%) with HbS-Beta thalassemia were included. At the level of the SCP, in the HbSS group both VD and FD were significantly lower compared to the HbSC group (VD: 30.89% vs 34.36%,  $p = 0.009$ ; FD: 1.57 vs 1.61,  $p < 0.001$ ). Moreover, VD differed significantly in the SCP between HbSC and HbS-Beta thalassemia group (VD 34.36% vs 30.04%,  $p = 0.015$ ). In the DCP, in the HbSS group both VD and FD were significantly lower compared to the HbSC group (VD: 23.34% vs 25.55%,  $p = 0.04$ ; FD: 1.56 vs 1.60,  $p < 0.001$ ). A significant difference was found between HbSS and HbS-Beta thalassemia in terms of FD in the DCP ( $p = 0.02$ ). **CONCLUSIONS:** The HbSS genotype of sickle cell patients presents a significantly lower VD and FD in both capillary plexa, suggesting, by means of OCTA, a more severe macular involvement than in HbSC and the HbS-beta thalassemia genotype. **Keywords:** OCT angiography, Sickle cell retinopathy



POSTER ABSTRACTS

P-040

Swept-Source Optical Coherence Tomography Angiography in choroidal macrovessel

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**OBJECTIVE:** Choroidal macrovessels have been reported as a rare choroidal vascular anomaly. The aim of this case-report was to describe optical coherence tomography angiography (OCTA) findings in a choroidal macrovessel. **MATERIAL-METHODS:** Conventional multimodal imaging (MMI) including enhanced depth imaging OCT (EDI-OCT Spectralis, Heidelberg Engineering, Heidelberg Germany), ultra-wide fundus (UWF) color photography, UWF fundus autofluorescence, UWF fluorescein angiography (FA) and UWF indocyanine green angiography (ICGA) (Optos, Dunfermline, United Kingdom) correlated with swept-source OCTA (Plex Elite, Carl Zeiss Meditec, Inc., Dublin, CA) findings were analyzed. **RESULTS:** A 72-year-old African ascendant woman presented a chorioretinal macular fold in her left eye. The patient had no medical history and had a cataract surgery in both eyes. Best corrected visual acuity was 20/20 in both eyes. Dilated fundus examination of the left eye revealed a serpiginoid choroidal lesion in the inferior macula without any sign of acute inflammation in her left eye. Enhanced depth imaging OCT (EDI-OCT) showed a large choroidal tortuous vessel. Fluorescein angiography of the left eye showed an early hyperfluorescence corresponding to the macular lesion without late leakage. Indocyanine green angiography showed an early hyperfluorescence of the lesion without choroidal hyperpermeability in the late frames. OCT-Angiography showed a normal retinal and choriocapillaris vascularization without flow void. The choroidal segmentation showed that the macrovessel was hyporeflective as the normal choroidal vessels. All examinations were normal in the right eye. **CONCLUSIONS:** Choroidal macrovessel is an idiopathic anatomical variation without functional impairment in our patient. In this case-report we described conventional MMI and OCTA findings in this rare lesion. t  
Keywords: OCT-A, choroid, macrovessel, multimodal imaging



POSTER ABSTRACTS

P-041

Optical Coherence Tomography Angiography in different types of photic maculopathy

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**OBJECTIVE:**We aim to assess Optical Coherence Tomography Angiography (OCT-A) changes in two types of photic maculopathy: Solar Maculopathy and Laser Pointer Maculopathy.

**MATERIAL-METHODS:**A series of two patients (A and B) with photic maculopathy who underwent an OCT-A exam 3 mm x 3 mm (Optovue RTVue-XR Avanti). Patient A and B presented with solar and laser pointer maculopathy, respectively

**RESULTS:**CASE 1:

A 29-year-old male with history of sungazing presented with blurred vision and central scotoma in his left eye. Fundus examination showed a round, yellowish-white discoid lesion on the left fovea and a smaller one on the right fovea. Optical Coherence Tomography Spectral Domain (OCT-SD) showed abnormal outer segment hyperreflectivity and discontinuity of the interdigitation zone in the right eye and near fullthickness hyperreflectivity at the center of the fovea, with hyporefectivity of the outer segment and interdigitation zone in the left eye. OCT-A was normal in both eyes.

CASE 2:

A 26-year-old man with a history of self-inflicted handheld laser exposure presented with blurred vision in his left eye.. Fundus examination revealed bilateral and asymmetric yellow macular lesions. OCT-SD revealed interruption in the ellipsoidal area and the retrofoveal pigment epithelium more marked on the left eye. The OCT en-face has shown a hyper-reflective foveolar lesion with a hyporefective in the center in both eyes. The OCT-A didn't show obvious abnormalities in the superficial and deep plexi except for a localized rupture of the peri-foveal anastomotic arcade, resulting in an irregular central avascular zone (CAZ) with hyporefective zones in the outer retina and the choriocapillary in both eyes.

**CONCLUSIONS:**OCT-A is a recent and promising imaging technique, whose use in the study of photic maculopathy can bring informations in vivo to better understand its physiopathological mechanism.

**Keywords:** Optical Coherence Tomography Angiography, photic maculopathy



POSTER ABSTRACTS

P-042

Diabetic retinopathy screening using optical coherence tomography angiography: a new approach

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**OBJECTIVE:** The purpose of this study is to introduce a new approach in diagnosing non-proliferative diabetic retinopathy (NPDR) using Optical Coherence Tomography Angiography (OCT-A)

**MATERIAL-METHODS:** A prospective, monocentric study including 60 adults with type 2 diabetes mellitus divided into two groups:

- Group 1 included 30 patients whose fundus examination and fluorescein angiography showed NPDR.
- Group 2 included patients without diabetic retinopathy (no DR).

All patients underwent OCT-A scans 6 mm x 6 mm (Optovue RTVue-XR Avanti). We evaluated vessel density in the superficial layer and the size of the foveal avascular zone (FAZ).

**RESULTS:** The mean age of subjects with type 2 diabetes mellitus was 61.3 years. Sex-ratio was 0.71. There was no statistically significant difference between the two groups (NPDR and no DR) with respect to age, gender proportion and medical history. Both vessel density in the superficial layer and measures of the FAZ showed a significant accuracy in distinguishing NPDR from no DR

**CONCLUSIONS:** OCT-A showed a noteworthy accuracy in the diagnosis of NPDR. However, its specificity needs to be investigated in further studies

**Keywords:** Diabetic retinopathy, optical coherence tomography angiography



POSTER ABSTRACTS

P-043

Idiopathic Foveal Hypoplasia: Quantitative Analysis Using Optical Coherence Tomography Angiography

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**OBJECTIVE:** To quantitatively evaluate fractal dimension (FD), vascular density (VD) and skeletal density (SD) on optical coherence tomography angiography (OCTA) in eyes presenting with idiopathic foveal hypoplasia (IFH), using a fully automated method.

**MATERIAL-METHODS:** Retrospective consecutive observational case series.

Patients presenting with IFH to Creteil University Eye Clinic between January 2015 and October 2018 and age-matched healthy controls were retrospectively evaluated. Group 1 consisted of IFH eyes while group 2 consisted of healthy age-matched control eyes. All IFH eyes had undergone a comprehensive ophthalmic examination and multimodal imaging at baseline. OCTA (AngioVue RTVue XR Avanti, Optovue, Inc., CA) was performed at baseline. VD, SD and FD (box-counting method) analysis were computed on OCTA superficial and deep capillary plexa (SCP, DCP) images at baseline using a custom automated algorithm developed in Matlab (The MathWorks, Inc., USA).

**RESULTS:** 35 consecutive eyes of 21 patients (18 eyes with IFH (Group 1) and 17 healthy control eyes (Group 2)) were included. Mean age was 62.8 in Group 1 and 68.6 in Group 2. A statistically significant decrease of VD at the level of the SCP and DCP was found in eyes with IFH compared to healthy control eyes ( $p=0.003$  for VD at the level of the SCP and  $p=0.005$  for VD at the level of the DCP, respectively). SD was also significantly decreased in IFH eyes at the level of both SCP and DCP ( $p<0.001$ ).

FD was significantly lower in IFH eyes compared to healthy control eyes at the level of both SCP and DCP ( $p<0.001$ ). **CONCLUSIONS:** FD, VD and SD are reduced at the level of the SCP and DCP in patients with IFH compared to normal controls, reflecting thereby a particular anatomical and vascular organization in these patients who usually present with a reduced or absent foveal avascular zone on OCTA. Quantitative analysis using OCTA using a custom algorithm could help to evaluate severity and better understand the mechanism of disease.

**Keywords:** OCTA-Angiography, Fovea Plana, Fractal Dimension



POSTER ABSTRACTS

P-044

Photodynamic Therapy Of Choroidal Metastasis

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**OBJECTIVE:**Photodynamic therapy (PDT) is now largely used in some eye cancers treatment. Our study describes the clinical efficacy of photodynamic therapy in patients with choroidal metastasis.

**MATERIAL-METHODS:** After injection into the bloodstream, Visudyne (6 mg/m<sup>2</sup> dose) selectively accumulates in the abnormal blood vessels in the retina and choroid. A laser beam at 689 nm is then applied to the lesion immediately after infusion, with a radiant exposure of 100 J/cm<sup>2</sup> over an interval of 83 s, at an irradiance of 600 mW/cm<sup>2</sup>, over an interval of 166 s. Diode laser activates the phototoxic Visudyne sealing leaking blood vessels by triggering the release of free radicals in the areas needing treatment. Choroidal metastases are the most common intraocular malignancy in adults. Symptoms due to ocular metastases depend on the location and characteristics of the lesions. Although most patients remain asymptomatic, blurred vision and a decrease in visual acuity can be observed, with a negative impact on the quality of life of affected patients]. These symptoms are due to the posterior localization of metastasis and the associated exudation tumor.

**RESULTS:**In our study, we evaluated PDT efficacy for symptomatic choroidal metastasis with rapid reabsorption of subretinal fluid and increased visual acuity.

**CONCLUSIONS:**Management of ocular metastases is palliative since treatment is limited to the primary. The actual benefit of a local treatment should be considered in view of the limited life expectancy of metastatic patients. Therefore, it is important to provide an acceptable quality of life by improving the visual condition of affected patients. Photodynamic therapy improves functional outcome in a shorter time than systemic therapy.

**Keywords:** intraocular tumors, choroidal metastasis, photodynamic therapy, OCT-Angiography, retinal imaging, uveal metastasis



POSTER ABSTRACTS

P-045

SS OCT and SS OCT A findings in circumscribed choroidal hemangioma

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**OBJECTIVE:**To describe the findings in circumscribed choroidal haemangioma (CCH) using swept source optical coherence tomography (SS OCT) and SS OCT angiography (SS OCT A)

**MATERIAL-METHODS:**The SS OCT and SS OCT A images of two patients with CCH were analyzed. The diagnosis of CCH was made on fundus examination, SS OCT, autofluorescence images, fluorescein angiography and B-scan ultrasonography. Indocyanine green angiography was performed only in one case

**RESULTS:**The first patient presented with a juxtapapillary lesion and the second one with a macular location. SS OCT B scan at the fovea showed macular edema and subretinal fluid in the first case and subretinal fluid in the second one. In both cases, SS OCT through the tumor showed low to medium homogenous reflective signals from the lesion and elevation of retinal pigment epithelium with intra and subretinal fluid. SS OCT A showed at choriocapillaris layer irregularly arranged vessels, and deeper choroidal layer showed irregular choroidal vessels with "clublike" appearance. At the margin of the tumor, there was a sudden transition from irregularly arranged choroidal vessel to regularly arranged normal vessels.

**CONCLUSIONS:**SS OCTA is a noninvasive tool to assess the choroidal vascular pattern in eyes with CCH

**Keywords:** circumscribed choroidal haemangioma, swept source optical coherence tomography, SS OCT angiography



POSTER ABSTRACTS

P-046

An unusual location of neovascularization in angioid streaks

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**OBJECTIVE:**To show a juxtapapillary neovascularization complication angioid streaks with OCT-angiography.

**MATERIAL-METHODS:**Case-report

**RESULTS:**We present the case of a 55 year-old woman with a known diagnosis of pseudoxanthoma elasticum with angioid streaks complicated in the left with new vessels treated for 5 years by intravitreal anti-VEGF. She presented at our department for a follow-up, she had no complain. Her visual acuity was 20/20 on the right eye and 20/250 in the left eye. Fundus examination revealed a macular scar and several haemorrhages in the nasal part of the optic nerve. OCT identified a small serous detachment. While fluorescein angiography barely identified the neovascularization, this could be better identified by OCT-angiography.

**CONCLUSIONS:**OCT-angiography allows a good visualization of extramacular choroidal neovascularization complicating angioid streaks

**Keywords:** Angioid streaks. Extrafoveal neovascularization. OCT-angiography





POSTER ABSTRACTS

P-047

Optical coherence tomography angiography in acute macular neuroretinopathy

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**OBJECTIVE:**To describe microvascular changes in acute macular neuroretinopathy (AMNR) type 2.

**MATERIAL-METHODS:**Observation

A 43-year-old woman complaining of sudden paracentral scotoma affecting the left eye. Medical and ocular history were entirely unremarkable. Visual acuity was 10/10 in the right eye and 2/10 in the left eye. Slit-lamp examination of the anterior segment was normal without afferent pupillary defect. Fundus examination showed small retinal hemorrhages in the posterior pole. Fluorescein and Indocyanine green angiographies were also unremarkable. Goldmann perimetry confirm the visual field defect. Near infrared reflectance demonstrated a hyporeflective paracentral lesion in the left eye. Swept source optical coherence tomography revealed focal disruption of both the ellipsoid and interdigitation zones with corresponding outer plexiform layer thickening and outer nuclear layer thinning. The en-face OCT at the level of outer retina demonstrated petaloid lesion pointing toward the fovea. OCT angiography showed reduced flow signal to the deep capillary plexus (DCP) and reduction of density in the density map. spontaneous progressive partial restoration of the outer retina occurs. **RESULTS:**Acute macular neuroretinopathy (AMN) is a rare retinal disorder first described by Bos and Deutman in 1975. Recently, two form have been defined by Sarraf et al based on characteristic features with spectral-domain optical coherence tomography (SD-OCT). The type 2 AMN occur in young and healthy women and was associated with SD-OCT findings of outer macular involvement.

**CONCLUSIONS:**OCT angiography in acute macular neuroretinopathy type 2 demonstrates reduced flow signal limited to the deep capillary plexus.

**Keywords:** optical coherence tomography angiography- acute macular neuroretinopathy



POSTER ABSTRACTS

P-048

Swept source OCT - angiography in diagnosis of retinal angiomatous proliferation

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**OBJECTIVE:** To characterize the vascular structure of retinal angiomatous proliferation (RAP) secondary to age-related macular degeneration (AMD), using swept source optical coherence tomography angiography.

**MATERIAL-METHODS:** We studied two cases with unilateral RAP. They underwent clinical examination and multimodal imaging, including swept source optical coherence tomography (OCT) and angiography (OCTA).

**RESULTS:** In the first eye, en face OCTA showed a tiny circular hyper-signal neovascularization, visible in the deep capillary plexus, the outer retina, and communicating with the choriocapillaris. OCTA could also detect a telangiectatic capillary dilation in the superficial capillary plexus, at the origin of the retinal neovascularization. The lesion size was 0.07 mm<sup>2</sup>. In the second eye, OCTA showed a slightly larger hyper-signal neovascularization (0.12 mm<sup>2</sup>), visible in the outer retina slab. Cross-sectional OCTA showed, in both eyes, an intra-retinal high flow.

**CONCLUSIONS:** En face OCTA is a useful tool for diagnosing retinal angiomatous proliferation. It could identify small intraretinal neovascular complexes in 2 eyes with RAP secondary to AMD. Cross-sectional OCTA was helpful, highlighting the elevated vascular flow within the retinal neovascularization.

**Keywords:** Retinal angiomatous proliferation, Type 3 CNV, AMD, Optical coherence tomography angiography, OCTA



POSTER ABSTRACTS

P-049

Swept source OCT - angiography in aneurysmal type 1 neovascularization

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**OBJECTIVE:**To assess the ability of swept source optical coherence tomography angiography in detecting aneurysmal lesions and branching vascular network in cases of aneurysmal type 1 neovascularization. **MATERIAL-METHODS:**We performed a clinical and multimodal imaging of 3 eyes with aneurysmal type 1 neovascularization. Patients underwent fundus examination, fluorescein and indocyanine green angiography, and swept source en face and cross-sectional optical coherence tomography (OCT) and angiography (OCTA). **RESULTS:**Aneurysmal lesions were detected on en face OCT-A in all eyes. However, we reported a proper vascular signal in the outer retina slab (OR) within the polyp in one eye. In 2 eyes, we observed indirect signs of aneurysmal dilations, as hyperreflective projection of the retinal pigment epithelium (RPE) in the deep capillary plexus and the back shadowing of the pigment epithelium detachment (PED) in the choriocapillaris (CC) slab. Moreover, OCTA could detect a branching vascular network (BVN) in all eyes. It was seen as a hyper-signal vascular network in the OR slab in 3 eyes and partially visible in the CC slab in 2 eyes. On cross-sectional OCTA, BVN corresponded to a flat hyperreflective PED in 2 eyes, and irregular elevations of RPE in one eye.

**CONCLUSIONS:**Swept source OCTA can detect aneurysmal neovascularization and associated branching vascular network. Besides, it allows a direct correlation between the aneurysmal lesions, the BVN and the chorioretinal structures.

**Keywords:** Aneurysmal type 1 neovascularization, PCV, Optical coherence tomography angiography, OCTA



POSTER ABSTRACTS

P-050

Alteration of visual acuity and macular retinal structure modification on OCT-angiography after silicone oil tamponade for retinal detachment

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**OBJECTIVE:** Vision loss after silicone oil (SO) removal for retinal detachment (RD) have been widely described (1) and multiple causes were reported (2). The development of macular cysts (MC) has been poorly studied. The objective of this study was to evaluate the frequency of MC after SO removal, their eventual relation with visual acuity, macular capillary density and foveal avascular zone (FAZ) area using OCT-angiography. **MATERIAL-METHODS:** This study was retrospective. All patients included had undergone a pars plana vitrectomy for RD with SO tamponade. Secondary SO removal had been achieved with no recurrence of RD. A 6x6 CIRRUS OCT-angiography image had been realized in all patients after removal and best corrected visual acuity (BCVA) had been measured at the same time. In patients presenting with MC, cysts' area was measured on the en face OCT-angiography image using ImageJ software. Superficial FAZ area and superficial capillary perfusion (SCP) were automatically generated by the OCT microangiography-complex (OMAG) algorithm. Deep FAZ and deep capillary perfusion (DCP) were measured according to a previously described method using ImageJ software (3). **RESULTS:** 43 eyes of 41 patients were included. Mean age of the 29 men and 12 women was 60 years. MC were present in 25 eyes (58%). Mean BCVA (LogMAR) in MC patients was significantly lower than in non-MC patients ( $p=0,012$ ) and cysts' area showed negative linear correlation with BCVA ( $p=0,0201$ ). SCP was significantly higher in MC eyes ( $p<0,0001$ ) while cysts' area was negatively correlated to the DCP with high significance ( $p<0,001$ ). Superficial FAZ area was bigger in non-MC eyes with high significance ( $p<0,0001$ ). **CONCLUSIONS:** The incidence of MC after SO removal is greater than 50%. These latter are associated with a decreased vision and structural remodeling of the macular superficial and deep capillary networks which might be the result of SO-induced hypoxia, leading to macular edema after removal.

**Keywords:** macular cysts, silicone oil removal, retinal detachment, OCT-angiography, capillary density



POSTER ABSTRACTS

P-051

Optical coherence tomography angiography in angiod streaks

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**OBJECTIVE:**To describe the features of angiod streaks (AS) using swept source optical coherence tomography angiography.

**MATERIAL-METHODS:**Retrospective observational study of eyes with AS. All patients underwent slit-lamp and fundus examination, color fundus photography, fluorescein angiography, swept source optical coherence tomography (OCT) and angiography (OCTA). Eyes with and without choroidal neovascularization (CNV) were evaluated. **RESULTS:**Thirty-one eyes of 16 consecutive patients diagnosed with AS were included. Twenty-four of 31 eyes had a neovascular complication. Streaks involving the macula were visible on en face OCTA as hyposignal lines in the outer retina slab. Diffuse choriocapillaris rarefaction (CR) was detected in 94% of eyes. Irregular vascular network (IVN) was detected in 80% of eyes and filled spaces between streaks. On structural OCT, it corresponded to flat elevation of the retinal pigmentary epithelium (RPE) with hyper reflective accumulations between the RPE and the Bruch's membrane (BM).

Concerning eyes with neovascular complication, CNVs were active in 4 eyes and inactive in 20 eyes. The detection sensitivity of CNV on en face OCTA was 100%. In one eye, OCTA could detect 2 distinct neovascular networks. All active CNVs had a well-defined shape and a branching dense capillary network in 75% of cases. On the other hand, 55% of inactive CNVs showed long filamentous vessels and 70% of lesions had a loose vascular network with a "dead tree" appearance. The majority of CNVs seemed to rise from a BM disruption and followed the path of the streaks. **CONCLUSIONS:**OCTA allows early detection and monitoring of AS and their neovascular complication. Besides, it shows CR and can detect the presence of IVN. OCTA can be a valuable tool for evaluation of CNV activity and cross-sectional OCTA obtained on the same scan, provides additional structural information about CNV activity.

**Keywords:** Angiod streaks, Choroidal neovascularization, Optical coherence tomography angiography, OCTA



POSTER ABSTRACTS

P-052

A Misleading Positive OCT-A on a Lacquer Crack

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**OBJECTIVE:** To show that OCT-A can be misleading and that the studying of artifacts is necessary to be more specific in diagnosing neovessels.

**MATERIAL-METHODS:** A case-report of a 40 years old woman, with a history of myopic neovessels, whose fundus examination revealed a hemorrhage, and the OCT showed Subretinal Hyper-Reflective Material in the regular follow-up.

**RESULTS:** The Fluorescein Angiography showed no sign of neovascularization, neither did the automated segmentation in OCT-A. But the manual segmentation in OCT-A going through the lesion revealed an abnormal image. The hemorrhage eventually disappeared after a month and was secondary to a lacquer crack that appeared in late Indocyanine Green Angiography.

**CONCLUSIONS:** The artifacts are frequent in OCT-A and can lead to inappropriate treatment.

**Keywords:** OCT-A, Neovascularization, Lacquer Cracks, High Myopia



POSTER ABSTRACTS

P-053

Optical coherence tomography angiography in foveal hypoplasia: case report

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**OBJECTIVE:**To describe optical coherence tomography angiography (OCT-A) findings in foveal hypoplasia.

**MATERIAL-METHODS:**Observational case report of one patient

**RESULTS:**A 60-year-old female with cutaneous albinism presented for decreased visual acuity in both eyes. Ophthalmic examination showed nystagmus. The best-corrected visual acuity was 2/10 in both eyes. Biomicroscopy of anterior segment revealed iris transillumination defects suggestive of ocular albinism, pupillary evaluation, intraocular pressure and lens examination were normal in both eyes. Fundus examination showed a depigmented appearance of the retina with poorly defined foveal area, without foveal reflection. Blood vessels did not respect the foveal avascular zone (FAZ). Swept-source optical coherence tomography revealed the absence of foveal pit, plexiform layers and outer segment lengthening and the presence of outer nuclear layer widening (grade 3 of foveal hypoplasia according to the OCT grading system proposed by Thomas and Gottlob). OCT-A examination revealed the absence of FAZ with a widespread vascular network either in the superficial or in the deep capillary plexus.

**CONCLUSIONS:**Foveal hypoplasia is a rare condition characterized by a disturbed development of foveal depression, an absence of foveal pigmentation and foveal avascular zone, with persistence of inner retinal layers in the foveal region. The clinical diagnosis has largely benefited from the advent of optical coherence tomography and currently, of OCT angiography.

**Keywords:** Optical coherence tomography angiography, foveal hypoplasia



POSTER ABSTRACTS

P-054

Multimodal imaging in unilateral acute idiopathic maculopathy: A case report

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**OBJECTIVE:**To describe results of multimodal imaging in a case of unilateral acute idiopathic maculopathy (UAIM).

**MATERIAL-METHODS:**A single case report

**RESULTS:**A 26-year-old male with unremarkable medical history presented with a 3-day history of a paracentral scotoma and blurred vision in his right eye (RE). On examination, his best corrected visual acuity was 20/40 in the right eye and 20/20 in the left eye (OS). Slit-lamp biomicroscopy showed no cells in the anterior chamber or in the vitreous in both eyes. Fundus biomicroscopy revealed a gray-yellow wedge-shaped macular lesion in the RE. Fundus autofluorescence showed a complex, mixed pattern of hypoautofluorescence and hyperautofluorescence. Fluorescein angiography revealed early mottled hypofluorescence of the macular lesion with late staining. Indocyanine green angiography revealed a round hypofluorescent lesion in the late phase. SS-OCT showed neurosensory detachment of the retina, with irregular thickening of the outer retina due to disruption and irregularity of the photoreceptor outer segment, retinal pigment epithelium and external limiting membrane. SS-OCTA showed a dark pattern at the level of the choriocapillaris suggestive of choriocapillaris hypoperfusion. Careful questioning of the patient revealed a history of flu-like symptoms including sores in the mouth pharyngeal pain and fever followed by rash on the hands and left foot 6 days prior to the onset of the visual disturbance. Clinical presentation was suggestive of UAIM. The patient was treated by oral corticosteroids. One month after initial presentation, the visual acuity had improved to 20/20. SS-OCTA showed obvious resolution of the choriocapillaris hypoperfusion.

**CONCLUSIONS:**UAIM is a rare disease affecting young healthy patients resulting in moderate to severe unilateral visual loss. Multimodal imaging is useful in the diagnosis and monitoring of this entity.

**Keywords:** retina, acute idiopathic maculopathy, OCT angiography, imaging





POSTER ABSTRACTS

P-055

Statistical Model of Optical Coherence Tomography Angiography Parameters That Correlate With Severity of Diabetic Retinopathy

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**OBJECTIVE:**To determine the utility of a model that combines multiple quantitative optical coherence tomography angiography (OCTA) parameters. We wanted to study whether this model has a high sensitivity and specificity allowing us to distinguish eyes with nonproliferative diabetic retinopathy (NPDR) from those with proliferative (PDR), and also distinguish eyes with diabetes and no DR (NoDR) from those with clinical DR (any DR). **MATERIAL-METHODS:**Cross-sectional study including 28 eyes (17 patients) with NoDR, 54 eyes (34 patients) with NPDR, and 56 eyes (36 patients) with PDR. We measured foveal avascular zone (FAZ) area, acircularity, vessel density, skeletonized vessel density, fractal dimension, and intersections and average vessel diameter for the superficial (SCP) and the deep capillary plexus (DCP). We used binary logistic regression models to identify significant OCTA parameters, and calculated the sensitivity and specificity for each model. **RESULTS:**We identified the SCP FAZ area, DCP vessel density, and acircularity as parameters that best distinguished between DR severity groups. The area (AUC) under the receiver operating characteristic curve for NPDR versus PDR was 0.845 ( $P < 0.001$ ) with a sensitivity and specificity of 86% and 70%, respectively. NoDR versus any DR showed an AUC of 0.946 ( $P < 0.001$ ) with sensitivity of 89% and specificity of 96%. The model performed well in both males and females. **CONCLUSIONS:**We identified a set of OCTA parameters that, combined, achieved a high sensitivity and specificity for distinguishing groups of eyes based on their DR severity. These findings suggest a potential clinical application for OCTA as a screening tool for DR in patients with diabetes and as a rapid test for high risk PDR that may require treatment.

**Keywords:** Diabetic retinopathy, OCTA



POSTER ABSTRACTS

P-056

Optical coherence tomography angiography findings in a case of congenital retinal macrovessel

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**OBJECTIVE:**To report Swept-source optical coherence tomography angiography (SS-OCT-A) findings in a patient with congenital retinal macrovessel.

**MATERIAL-METHODS:**Case report

**RESULTS:**An 11-year-old boy presented with low visual acuity in the left eye. Best corrected visual acuity was counting fingers. Fundus examination showed a congenital retinal macrovessel. SS-OCT-A imaging of the left fundus demonstrated the aberrant vessel passing through the center of the fovea confined to the superficial capillary plexus with significant loss of the foveal avascular zone at the levels of the superficial and deep capillary plexus. Outer retinal and choriocapillaris SS-OCT-A did not show any abnormal findings.

**CONCLUSIONS:**OCT-A may be a valuable tool for noninvasively further characterize this rare condition that affects foveal morphology and retinal vasculature.

**Keywords:** OCTA; Congenital retinal macrovessel



POSTER ABSTRACTS

P-057

En face OCT findings in laser pointer maculopathy: a report of three cases

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**OBJECTIVE:**To describe clinical and multimodal imaging findings in laser pointer maculopathy.  
**MATERIAL-METHODS:**A report of three cases (6 eyes) diagnosed with laser pointer induced-maculopathy. The three patients, aged 6, 13 and 29 years old, underwent a complete ophthalmic exam with examination of the fundus, auto fluorescence, swept source OCT, structural en-face OCT, and OCT angiography.

**RESULTS:**Examination of the fundus revealed macular pigment epithelium alteration and retinal yellowish lesions in 4 eyes and was normal in 2 eyes. Retinal autofluorescence revealed abnormalities in two patients that co-localized with the anomalies seen on fundus examination (4 eyes). SS OCT showed hyperreflective curvilinear bands that extend from the ellipsoid zone upwards ending at the level of the outer plexiform layer in one patient (2 eyes) and bilateral punctual interruption of the ellipsoid line in two patients (4 eyes). OCT angiography showed hypointense area in the choriocapillaris layer in 2 eyes and was normal in the other 4 eyes. En-face OCT of the outer retina showed hyper reflective lesion in 2 eyes and hypo reflective areas in 4 eyes that corresponds to the pathologic zone seen in the OCT B scan.

**CONCLUSIONS:**Multimodal imaging in laser pointer maculopathy reveals different lesions of the outer retina depending on the seniority of exposure and laser characteristics. En-face OCT is more sensitive to detect these lesions than autofluorescence and SS OCT B-scan. OCT-A may lead to a better understanding of the pathogenesis of laser retinal damage.

**Keywords:** Macula, pointed-laser, En face OCT



POSTER ABSTRACTS

P-058

Optical coherence tomography angiography in toxemia of pregnancy: a case report

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**OBJECTIVE:**To report swept-source optical coherence tomography angiography (OCTA) findings in a patient with toxemia of pregnancy.

**MATERIAL-METHODS:**A single case report

**RESULTS:**A 37-year-old woman diagnosed with toxemia of pregnancy presented with blurred vision in the left eye (LE) following delivery via Caesarian section. Best corrected visual acuity was 20/20 in the right eye (RE) and 20/32 in the LE. Fundus examination showed bilateral Elschnig's spots, with macular sparing in the RE. Fluorescein angiography revealed bilateral multifocal areas of delayed choroidal perfusion. Indocyanine green angiography showed areas of delayed choroidal perfusion in a geographic configuration in the early phase, with more severe involvement of the LE. In the late phase, there were hyperfluorescent dots associated with ischemic lesions of the early phase. Swept-source OCT at the level of Elschnig's spots mainly showed localized retinal thickening with shallow subretinal fluid, disruption of the ellipsoid band, and small hyperreflective deposits on the retinal pigment epithelium. Macular swept-source OCT angiography revealed areas of loss of signal at the level of choriocapillaris. Lesions were more confluent and extensive in the LE. A week after presentation, OCT angiography demonstrated markedly improved flow deficits of the choriocapillaris in both eyes.

**CONCLUSIONS:**OCT angiography non-invasively shows choriocapillaris ischemia related to hypertensive choroidopathy during toxemia of pregnancy. It is useful for both diagnosis and monitoring.

**Keywords:** Toxemia, pregnancy, OCT angiography



POSTER ABSTRACTS

P-059

Multimodal imaging in acute syphilitic posterior placoid chorioretinopathy

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**OBJECTIVE:**To describe multimodal imaging in acute syphilitic posterior placoid chorioretinopathy (ASPPC).

**MATERIAL-METHODS:**Observation

A 48 years-old man presented with sudden decrease of visual acuity in his right eye. On ophthalmic examination, best corrected visual acuity was limited to counting fingers in the right eye and at 10/10 in the left eye, anterior segment was normal, fundus examination showed a large yellowish placoid lesion in the posterior pole, including the macula. Fluorescein angiography showed early central hypofluorescence followed by progressive hyperfluorescence in the area of the lesion without angiographic evidence of intraretinal or subretinal fluid accumulation. Indocyanine green angiography showed variable hypofluorescence. The B scan OCT revealed outer retinal abnormalities on SD OCT imaging, including disruption of the ellipsoid zone with thickening of the RPE and small nodular elevations. The en-face OCT angiography at the level of outer retina demonstrated multiple hyperreflective dots. Syphilitic serology was positive (TPHA= 1/320, VDRL=1/8). Initiation of systemic penicillin therapy led to improvement of visual acuity to 7/10.

**RESULTS:**Ocular involvement occurs in 5 to 8% of syphilis cases; it has been reported at all disease stages but develops more frequently during the secondary and tertiary stages of the disease. Although the pathophysiology of ASPPC is not completely understood, reports of this condition postulated that an inflammatory reaction or immune complex deposition at the level of the choroid-RPE photoreceptor complex would lead to the clinical appearance of the placoid lesion and photoreceptor dysfunction.

**CONCLUSIONS:**Multimodal imaging in acute syphilitic posterior placoid chorioretinopathy showed outer retinal abnormalities.

**Keywords:** optical coherence tomography, syphilitic placoid chorioretinopathy



POSTER ABSTRACTS

P-060

Intraluminal Application of Argon Laser in Retinal Macroaneurysm Causes Rapid Absorption of Subretinal Hemorrhage

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**OBJECTIVE:**To describe the clinical course of a patient who presented with a subretinal hemorrhage due to a retinal macroaneurysm and was treated with intraluminal argon laser.

**MATERIAL-METHODS:**Analysis of clinical presentation, multimodal imaging and functional outcomes.

**RESULTS:**An 84 year old retired teacher with a history of hypertension and hemicrania, presented with subacute vision loss to 20/100+2 in her left eye. She described a "dark brown spot that grew larger and blocked [her] central vision over the course of the week." Funduscopy and multimodal imaging revealed a hemorrhagic form of a retinal macroaneurysm along the superotemporal artery, with subretinal hemorrhage occupying, in a typical fashion, the superior macula. Patient declined treatment and returned 3 days later with a further decrease in vision to 20/400. At that point, she consented to undergo laser treatment, which consisted of 7 burns of intraluminal argon laser application (spot size diameter 50 micron, power 100-120 mW, duration 50 ms) delivered via contact lens, that caused a visible shrinking of the macroaneurysm. She experienced rapid restoration of visual acuity to 20/20 three weeks later, following the absorption of subretinal and intraretinal hemorrhage, transudate and lipid. Funduscopy and multimodal imaging verified the obliteration of the macroaneurysmal lesion as well as the downstream patency of the retinal arterial arbor. Her microperimetry improved and she maintains intact acuity in that eye 31 months later.

**CONCLUSIONS:**When visibility affords it, intraluminal application of a few burns of mild argon laser is a safe and effective method in the treatment, without sequelae, of hemorrhagic forms of retinal macroaneurysms.

**Keywords:** Intraluminal argon laser, retinal macroaneurysm, subretinal hemorrhage.



POSTER ABSTRACTS

P-061

Clinical experience of combined therapy of macular edema with retinal vein occlusion

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**OBJECTIVE:** Analysis of the combined use of ranibizumab and retinalamin in the complex treatment of cystoid macular edema (ME) with non-ischemic retinal vein occlusion (RVO).

**MATERIAL-METHODS:** 20 eyes (20 people) aged from 40 to 75 years were divided into two groups, matched by sex, age, duration of thrombosis and intensity of ME. Comparison group (9 people) received only intravitreal injection of ranibizumab (IVIR) 0.5 mg (0.05 ml): 3 injections, 1 time per month. In the main group (11 people), 3 fold IVIR was supplemented with parabolbar injections of retinalamin in a dose of 5 mg of dry matter dissolved in 1.0 ml of 0.5% novocaine solution daily for 10 days. The results of the treatment were evaluated according to visometry, ophthalmoscopy, fluorescein angiography, optical coherence tomography. **RESULTS:** After 3 months, complete resorption of ME occurred in 8 eyes of main group (72.7%) and in 6 eyes of comparison group (66.7%). The increase in visual acuity to 0.5 and more occurred in 71.7% of main group and, respectively, in 56.4% of comparison group. After 6 months, ME was completely absent in all patients of both groups. Thus, the thickness of macular retina was approximately the same, averaging  $216.61 \pm 11.05$  and  $220 \pm 10.1$   $\mu$ m against the original  $414 \pm 11.3$  and  $396.44 \pm 15.1$   $\mu$ m, respectively. But, despite the comparable positive dynamics and terms of resorption of ME, the visometry data showed the presence of reliable intergroup differences. In particular, visual acuity in the main group increased by an average of  $0.31 \pm 0.05$ , and in the comparison group by  $0.15 \pm 0.03$  (the difference is statistically significant,  $p < 0.05$ ). **CONCLUSIONS:** The results of the study confirm the clinical feasibility of additional use of retinalamin in the treatment of ME in patients with RVO after intravitreal injection of ranibizumab to stimulate regenerative processes in the retina and enhance visual functions.

**Keywords:** macular edema, retinal vein occlusion, ranibizumab, retinalamin



POSTER ABSTRACTS

P-062

Intravitreal Bevacizumab for macular edema due to retinal vein occlusion: SS-OCT findings and prognosis

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**OBJECTIVE:**The aim of our work was to analyze macular findings by Swept source optical coherence tomography (SS-OCT) and to study visual prognosis factors.

**MATERIAL-METHODS:**Twenty-one eyes of 21 patients treated by intravitreal bevacizumab for ME due to RVO were retrospectively reviewed. All patients underwent SS-OCT imaging before and after treatment. Macular shape, thickness and structure in SS-OCT before and at the end of treatment were analyzed. The correlations between initial and final SS-OCT findings, and the clinical data were statistically analysed.

**RESULTS:**The mean follow-up was 14.6 months. The mean delay of treatment was 9.7 weeks. initial SS-OCT findings included mean initial central macular thickness  $625.85 \pm 245.84 \mu\text{m}$ , intraretinal cysts in 20 eyes (95.2%), serous retinal detachment in 7 eyes (33.3%), alteration of ellipsoid zone in 7 eyes (33.3%) and hyperreflective foci in 3 eyes (14.3%). SS-OCT at the end of treatment found a normal shape and structure of the macula in 15 eyes (group 1) with a mean best corrected visual acuity (BCVA) that improved from  $1.12 \pm 0.46 \log\text{MAR}$  to  $0.42 \pm 0.33 \log\text{MAR}$ . We noticed the presence of cystoid macular degeneration in 4 eyes (19%), macular epiretinal membrane in 3 eyes (14.3%), macular atrophy in 2 eyes (9.5%) and macular lamellar hole in 1 eye (4.8%). Mean BCVA in this group (group 2) improved from  $1.5 \pm 0.21 \log\text{MAR}$  to  $0.96 \pm 0.32 \log\text{MAR}$ . Mean BCVA at the end of follow-up was statistically worst in the second group ( $p < 0.05$ ).

**CONCLUSIONS:**SS-OCT is a non-invasive imaging tool that allows diagnosis, quantification and follow-up of macular edema secondary to retinal vein occlusion. The late delay of treatment and the initial alteration of the ellipsoid zone are associated with macular atrophy, macular epiretinal membrane and cystoid macular degeneration and so poor visual outcome.

**Keywords:** macular edema, retinal vein occlusion, bevacizumab, optical coherence tomography





POSTER ABSTRACTS

P-063

Multimodal imaging in a case of relentless placoid chorioretinitis associated with granulomatous anterior uveitis

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**OBJECTIVE:**to describe findings of multimodal imaging including OCT angiography in a case of relentless placoid chorioretinitis (RPC)

**MATERIAL-METHODS:**A case report

**RESULTS:**A 53-year-old woman presented with a 2-month history of ocular pain and blurring vision in the right eye (RE). The best corrected visual acuity was 20/32 in the RE and 20/20 in the left eye (LE). Slit-lamp examination revealed fine keratic precipitates, Koeppe nodules, and 1+ vitreous cells in the RE. Fundus examination showed disc swelling and active creamy placoid confluent lesions in the posterior pole and the temporal and the inferior periphery of the RE. There were atrophic pigmented lesions in nasal periphery in the LE. Active lesions were hypo and hyperautofluorescent on fundus autofluorescence, hypofluorescent in the early phase with late staining on fluorescein angiography, and hypofluorescent throughout the indocyanine green angiography sequence. Swept-source OCT showed disruption of the outer retinal layers and swept-source OCT angiography revealed extensive areas of loss of signal at the level of choriocapillaris. Results of work-up including a complete blood count, syphilis serology, C-reactive protein, erythrocyte sedimentation rate, chest X-ray, Mantoux test, and QuantiFERON-TB Gold test were normal or negative. The inflammation was controlled with oral corticosteroids associated with azathioprine and periocular injection of triamcinolone acetonide. OCT showed resolution of the major disruption except for the loss of the ellipsoid band, and the OCT angiography revealed a partial restoration of the choriocapillaris perfusion. Four months later, the patient developed a relapse evidenced by multimodal imaging

**CONCLUSIONS:**RPC may be associated with granulomatous anterior uveitis. It is characterized by a prolonged and relapsing course. Multimodal imaging is helpful in diagnosis, in differentiating between active and inactive lesions, and in monitoring the disease course

**Keywords:** relentless placoid chorioretinitis, multimodal imaging, Swept-source OCT



POSTER ABSTRACTS

P-064

Optical Coherence Tomography Angiography Analysis in Birdshot Choroidopathy Complicated by Choroidal Neovascularization

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**OBJECTIVE:** To report the case 70-year-old patient diagnosed with Birdshot Choroidopathy (BCR) complicated by choroidal neovascularization (CNV), identified by optical coherence tomography angiography (OCTA).

**MATERIAL-METHODS:** Observational case report of one patient.

**RESULTS:** We describe the case of a patient presenting with Birdshot Choroidopathy (BCR) complicated by choroidal neovascularization (CNV) on both eyes, previously treated by photodynamic therapy. At the last follow up visit the patient had a Snellen best corrected visual acuity (BCVA) of 20/40 in his right eye (RE) and 20/400 in his left eye (LE). Along with conventional angiography (fluorescein angiography [FA], indocyanine green angiography [ICGA]) and spectral-domain optical coherence angiography (SD-OCT, Spectralis, Heidelberg Engineering, Heidelberg, Germany), we performed optical coherence tomography angiography (OCTA, Angiovue, Optovue, Fremont, California, US). OCTA was able to reveal a high flow, abnormal vascular network in the choriocapillaris segmentation, as well as areas of choriocapillaris loss corresponding to inactive inflammatory lesions.

**CONCLUSIONS:** OCTA might be a helpful tool in the assessment of Birdshot Choroidopathy complicated by CNV, clearly delineating the neovascular membrane and the choriocapillaris alterations from the active and inactive characteristic inflammatory lesions.

**Keywords:** Birdshot Choroidopathy Complicated by Choroidal Neovascularization



POSTER ABSTRACTS

P-065

Optical coherence tomography angiography findings in Leber's neuroretinitis

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**OBJECTIVE:** Acute neuroretinitis is usually characterized by a unilateral decline in visual acuity, papilledema and star-shaped macular exudates with delayed onset. It requires etiological assessment before concluding to the diagnosis of Leber stellar neuroretinitis. We report the results of swept-source optical coherence tomography angiography (SS-OCTA) in two patients with unilateral Leber idiopathic acute neuroretinitis.

**MATERIAL-METHODS:** Both patients underwent a complete ophthalmologic examination with imaging including fundus color photographs, fluorescein angiography, swept-source optical coherence tomography (SS-OCT) and macular and papillary SS-OCTA.

**RESULTS:** A 21 and a 12-year-old patients consulted for a sudden unilateral vision loss with visual acuity at 5/10 and 4/10 respectively. The fundus examination revealed papillary edema and serous retinal detachment (SRD) in both cases associated with star-shaped macular exudates in one case. Fluorescein angiography showed papillary retention with leakage. Optical coherence tomography showed the macular exudates as well as the SRD. SS-OCTA of the affected eye showed an enlargement of the foveal avascular zone, disorganization of the superficial and deep capillary networks, and dark areas at the level of the deep capillary network in the SRD zone. The papillary SS-OCTA showed a decrease in peripapillary capillary network. The etiological assessment including serology and brain imaging was negative. The follow-up revealed a total visual recovery after 6 weeks in both cases with a complete resorption of the SRD and a normalization of the capillary networks on the macular OCTA. On papillary OCTA, we noted a partial restitution of the peripapillary capillary network.

**CONCLUSIONS:** OCTA showed a disorganization of macular and papillary vascular networks during the acute phase of Leber's stellar neuroretinitis. The spontaneous recovery of the visual function and the disappearance of the SRD are accompanied by the normalization of the superficial and deep retinal plexuses on OCTA.

**Keywords:** optical coherence tomography angiography, neuroretinitis, serous retinal detachment



POSTER ABSTRACTS

P-066

Intravitreal hemorrhage revealing tuberculosis-associated occlusive vasculitis

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**OBJECTIVE:**Intraocular tuberculosis (TB) is a great mimicker of various uveitis entities and it can be considered in the differential diagnosis of any type of intraocular inflammation. The aim of this report is to analyse multimodal imaging of a case of an intravitreal hemorrhage revealing tuberculosis-associated occlusive vasculitis.

**MATERIAL-METHODS:**Retrospective analysis of multimodal imaging findings, including fundus color photography, swept source optical coherence tomography (SS OCT), fluorescein angiography and optical coherence tomography angiography (OCTA) of a case of tuberculosis-associated occlusive vasculitis. Diagnosis of TB was based on clinical presentation, positive tuberculin skin test and positive interferon gamma release assay test (QuantiFERON).

**RESULTS:**A 27-year old man consulted for a sudden vision loss of his left eye (LE). The best-corrected visual acuity was 20/32 in the right eye (RE) and was limited to light perception in the LE. The fundus examination revealed multiple retinal hemorrhages and cotton wool spots in the RE and diffuse intravitreal hemorrhage in the LE. Fluorescein angiography showed occlusive peripheral vasculitis in the RE. OCTA revealed areas of retinal hypoperfusion in superficial and deep retinal capillary plexuses better seen than on fluorescein angiography, with an important enlargement of the foveal avascular zone. The choriocapillaris layer showed also areas of reduced perfusion. The patient underwent vitrectomy of the LE and had antituberculosis therapy. After one month of follow-up, the patient developed intravitreal hemorrhage in the RE, which was treated by vitrectomy successfully.

**CONCLUSIONS:**Intravitreal hemorrhage is an atypical presentation of tuberculosis-associated occlusive vasculitis. OCTA is a useful tool to better analyse the different clinical presentations in TB. In occlusive vasculitis, retinal ischemia of the superficial and deep capillary layers is well defined on OCTA.

**Keywords:** tuberculosis, vasculitis, intravitreal hemorrhage, optical coherence tomography angiography



POSTER ABSTRACTS

P-067

Uveitis related to immunotherapy treatment: medium term therapeutic response

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**OBJECTIVE:**Anti tumoral immunotherapy, especially monoclonal antibodies such as Nivolumab and Rituximab, or tyrosine kinases inhibitors like Ibrutinib are involved in uveitis genesis.

This uveitis can be complicated by macular edema and visual loss.

Different therapeutics options arising from collegiate discussion include suspension of immunotherapy, or introduction of immunosuppressive or immunomodulator treatment, following local or systemic administration. We describe medium terme response of 5 cases.

The purpose of this study is to describe clinical and para clinical features, before and after therapeutic intervention.

**MATERIAL-METHODS:**5 patients with chronic lymphoid leukemia, Waldenstrom's macroglobulinemia, lung adenocarcinoma and mesothelioma developed chronic bilateral uveitis complicated by macular edema. After a large etiologic investigation, uveitis is considered as a side effect of immunological therapy. Immunotherapy involved Nivolumab (n=3), Rituximab (1) and Ibrutinib (1).

**RESULTS:**Patients are 3 women and 2 men, with an average age of 74. They presented intermediate uveitis complicated with macular edema in 9 eyes. Average visual acuity was 5/10 for right and left eyes. Average flare was 93 (p/ms). Posterior synechiae was found in 6 eyes. Vitreous cellular reaction was 1+ in 4 eyes, 2+ in 2 eyes and 3 + in 4 eyes. Veinous vasculitis was found in 2 eyes.

Macular edema appears between 4 and 36 months. The therapeutic interventions that were done included treatment interruption for 3 patients, who all recovered, or a reintroduction of immunotherapy which induced a macular edema relapse. One patient was treated with systemic steroid therapy with a favorable response. These different therapeutic actions lead to a visual acuity recovery after 4 months.

**CONCLUSIONS:**Uveitis related to new immunological anti tumoral targeted therapy seems to be associated with good prognosis.

**Keywords:** Uveitis, Posterior uveitis, Nivolumab, Anti-PD1, Immune-related adverse events



POSTER ABSTRACTS

P-068

Retinal breaks associated with ocular inflammatory conditions

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**OBJECTIVE:**To describe clinical features, management and outcomes among patients presenting with retinal tears associated with ocular inflammatory conditions.

**MATERIAL-METHODS:**Retrospective review including 8 patients (10 eyes) diagnosed with retinal tears complicating inflammatory ocular diseases. Mean follow-up was 26 months (range, 2- 49).

**RESULTS:**Five patients were male and three patients were female. Mean age at uveitis onset was 23.5 years (range, 7-48 years). The mean best corrected visual acuity (BCVA) was 20/100 (range, light perception-20/20). Bilateral retinal tears were diagnosed in 2/8 cases (25%). Retinal tears were diagnosed at first presentation in 5/10 eyes (50%), and they occurred during the course of the ocular inflammatory disease in 5/10 eyes (50%). The mean time between the first ophthalmologic examination and occurrence of retinal tear was 10 months (range, 1-24 months). Uveitis was active in 6/10 eyes and it was classified anatomically as intermediate uveitis (n=5 eyes) and panuveitis (n=5 eyes). Etiologies were Behçet disease (n=4 cases; 50%), idiopathic intermediate uveitis (n=2 cases; 25%), sarcoidosis (n=1 case; 12.5%), and multiple sclerosis (n=1 case; 12.5%). Complications included giant retinal tear associated with retinal detachment in one eye (10%) and vitreous hemorrhage in 2 eyes (20%). Treatment included prophylactic argon laser photocoagulation in 9 cases (90%) and pars plana vitrectomy with silicone oil tamponade and endolaser in 1 eye.

**CONCLUSIONS:**The intraocular inflammation may interfere with visualization of the retina and complicate the management of retinal tears. A careful examination with a three-mirror lens is mandatory to detect and treat potential retinal tears.

**Keywords:** retinal tears, uveitis, intraocular inflammation



POSTER ABSTRACTS

P-069

Tropical foveolitis

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**OBJECTIVE:**To report the case of a Dengue virus maculopathy

**MATERIAL-METHODS:**We report the case of a 37 year old woman who presented a bilateral severe decrease of vision 13 days after a hemorrhagic fever secondary to a dengue virus infection.

**RESULTS:**Dengue virus primo infection was confirmed by the presence of IgM and positivity of the Dengue Virus RT PCR in the blood of the patient. Initial visual acuity was reduced as "counting fingers".

The patient presented an uncommon bilateral maculopathy, described by the term of cystic foveolitis. A multimodal imaging analysis was realised, allowing a precise description of the lesions. The patient received systemics corticosteroids for three weeks. After four months of follow-up, visual acuity raised to 20/40 on both eyes, and central visual field improved significantly.

**CONCLUSIONS:**The efficiency of any treatment has never been demonstrated in Dengue virus maculopathy. Many kinds of dengue virus maculopathy has been described; acute macular neuroretinopathy, cystic foveolitis, diffuse macular edema, cystoid edema, choroidopathy and Pseudohypopion. The vision usually recover spontaneously, but residual scotoma could be very frequent in cystic foveolitis.

**Keywords:** uveitis, dengue virus maculopathy, cystic foveolitis



POSTER ABSTRACTS

P-070

Vitreous hemorrhage associated with ocular inflammatory conditions

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**OBJECTIVE:** To describe clinical features, management and outcomes among patients diagnosed with vitreous hemorrhage associated with ocular inflammatory conditions.

**MATERIAL-METHODS:** Sixteen eyes of 15 patients diagnosed with vitreous hemorrhage complicating ocular inflammatory diseases were retrospectively reviewed. Mean follow-up was 31 months (range, 3- 48).

**RESULTS:** Twelve patients were male and three patients were female. Mean age was 24 years (range, 6-66 years). The mean best corrected visual acuity (BCVA) was 1/80. Vitreous hemorrhage occurred during the course of a previously known ocular inflammatory disease in 7 patients (46.66%), and it revealed the underlying inflammatory disorder in 8 patients (53.33%). Vitreous hemorrhage was unilateral in 14 cases and bilateral in one case. Etiologies were Eales disease (4 patients; 26.66%), idiopathic intermediate uveitis (5 patients; 33.33%), Behçet's disease (2 patients; 13.33%), ocular tuberculosis (2 patients; 13.33%), and ocular sarcoidosis (2 patients; 13.33%). The underlying mechanism of vitreous hemorrhage was ischemic retinal new vessels in 8 eyes (50%), inflammatory optic disc new vessels with no evidence of peripheral ischemia in 7 eyes (43.75%), and vasoproliferative retinal tumor complicating intermediate uveitis in one eye (6.25%). Treatment modalities included systemic corticosteroids (n=15), immunosuppressive drugs (n=2), antitubercular therapy (n=4), intravitreal bevacizumab (n=4), scatter retinal laser photocoagulation to ischemic areas (n=6), pars plana vitrectomy (n=4), and transconjunctival cryotherapy (n=1). In 5 cases, vitreous hemorrhage resolved spontaneously. Mean BCVA was 20/63 (range, no light perception-20/20) at the end of follow-up. Vitreous hemorrhage recurred in 2 cases.

**CONCLUSIONS:** Vitreous hemorrhage, due to multiple mechanisms, may complicate various intraocular inflammatory diseases. Early management of inflammation and hemorrhage is essential for better outcomes.

**Keywords:** Vitreous hemorrhage; uveitis; retinal ischemia





POSTER ABSTRACTS

P-071

Cytomegalovirus retinitis in a patient with Vogt-Koyanagi-Harada disease

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**OBJECTIVE:**To report a case of cytomegalovirus (CMV) retinitis in a patient with Vogt-Koyanagi-Harada (VKH) disease receiving high doses of systemic corticosteroids with azathioprine.

**MATERIAL-METHODS:**A case report.

**RESULTS:**A 33-year-old woman with unremarkable previous medical and ocular history was referred to our department with a 1-month history of bilateral blurring of vision. A diagnosis of a VKH disease was made based on typical clinical and multimodal imaging findings. The patient was prescribed oral prednisolone 1mg/kg/day and azathioprine 2.5mg/kg/day. The patient mistakenly received four times the prescribed dose of prednisolone for 14 days. The erroneous dose was progressively corrected with the help of endocrinologists. There was subsequent visual acuity improvement, with disappearance of exudative retinal detachments. Three months after initial presentation, the patient complained of decrease in vision. There were 2+ cells in the vitreous, sunset-glow fundus with diffuse vascular sheathing, retinal haemorrhages, and areas of small white granular lesions in the inferior retinal periphery in both eyes. Systemic corticosteroids and azathioprine were withdrawn. Results of work-up including complete blood count, syphilis serology, C-reactive protein, erythrocyte sedimentation rate, chest X-ray, Mantoux test, QuantiFERON-TB Gold, human immunodeficiency virus serology and brain MRI were normal or negative. Polymerase chain reaction on aqueous sample was positive for CMV DNA. The patient was given intravenous ganciclovir treatment administered for six weeks and two intravitreal ganciclovir injections. CMV retinitis was controlled, but the patient developed a VKH disease recurrence with shallow bilateral exudative retinal detachment and choroidal thickening on swept-source OCT. This recurrence was managed with oral prednisolone, at an initial dose of 0.5 mg/kg/day introduced while the patient was receiving antiviral treatment.

**CONCLUSIONS:**CMV retinitis may occur in patients with non-infectious uveitis as a consequence of highly aggressive systemic immunosuppressive therapy. Signs of viral retinitis overlap with signs of the preexisting non-infectious uveitis. Both diagnosis and management are challenging.

**Keywords:** retinitis, vogt-koyanagi-harada disease, cytomegalovirus



POSTER ABSTRACTS

P-072

Alternating bilateral dense preperipillary vitreous exudate associated with peripapillary retinal infiltrate revealing Behcet uveitis: a case report

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**OBJECTIVE:**To describe a case of alternating bilateral dense preperipillary vitreous exudate associated with peripapillary retinal infiltrate, revealing a Behcet disease.

**MATERIAL-METHODS:**A case report.

**RESULTS:**A 37-year-old patient presented with vision blurring in the left eye (LE). Examination revealed +1 vitreous cells and peripapillary retinitis lesion in the LE. Fluorescein angiography demonstrated early hypofluorescence and late staining of the retinitis lesion, and optic hyperfluorescence, with no vasculitis. The patient was initially diagnosed with toxoplasmic retinochoroiditis, and was treated accordingly. One year later, the patient complained of decrease of vision in the right eye (RE). Best-corrected visual acuity was 20/200 in the RE and 20/20 in the LE. There were 2+ vitreous cells in the RE and no vitreous inflammation in the LE. Fundus examination showed peripapillary superotemporal retinitis lesion associated with optic disc hyperemia in the RE and was unremarkable in the LE. Swept-source OCT in the RE showed hyperreflectivity and thickening of the inner retinal layer corresponding to the retinitis lesion, a mushroom-shaped hyperreflective vitreous condensation overlying the optic disc, and macular serous retinal detachment. Analysis of swept-source OCT scans taken during the initial episode of ocular inflammation of the LE found similar features. Spontaneous complete resolution of the retinitis lesion and the dense vitreous exudate in the RE occurred within 10 days, both on clinical examination and swept-source OCT. Physical examination by internist revealed genital and oral aphthous ulcerations, and pseudofolliculitis. Clinical ocular findings, recurrence of ocular inflammation in the fellow eye, spontaneous resolution of ocular lesions, and systemic manifestations were consistent with Behcet disease. The patient was prescribed systemic corticosteroids and azathioprine.

**CONCLUSIONS:**Early diagnosis of Behcet uveitis is of utmost importance for prompt initiation of appropriate treatment. Transient inflammatory preperipillary hyperreflective mushroom-shaped vitreous exudate on swept-source OCT is a rare finding. It is however highly suggestive of Behcet uveitis.

**Keywords:** uveitis, behcet disease, optical coherence tomography



POSTER ABSTRACTS

P-073

Vitreomacular interface abnormalities and glaucoma in an elderly population (The MONTRACHET study)

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**OBJECTIVE:** To investigate the prevalence of vitreomacular interface abnormalities (VMIA) in a French elderly glaucomatous population.

**MATERIAL-METHODS:** Using a population-based study, the MONTRACHET (Maculopathy Optic Nerve nuTRition neurovAsCular and HEArT diseases) study conducted in Dijon from 2009 to 2013 in subjects older than 75 years, the prevalence of VMIA was estimated on glaucoma patients.

**RESULTS:** A total of 1130 subjects (2225 eyes) were included in the study. The mean age of participants was  $82.3 \pm 3.8$  years and 62.74% were female. Regarding the frequency of all VMIA, there was no statistical difference between glaucoma patients and non-glaucoma participants (51.85% vs 53.92%, respectively,  $P = 0.372$ ). In univariate analysis, vitreomacular adhesions were more frequent in non-glaucoma participants (18.39% vs 10.78%,  $P = 0.036$ ). Epiretinal membranes were more frequent in the glaucomatous population (47.06% vs 38.13%,  $P = 0.018$ ). The prevalence of macular cysts was comparable in the two groups (7.84% vs 5.64%,  $P = 0.262$ ). However, macular cysts were more frequent in patients treated with preservative-free intraocular pressure (IOP)-lowering eye drops compared with subjects treated with IOP-lowering eye drops containing a preservative and non-glaucomatous participants (26.67% vs 3.37% and 5.76%, respectively,  $P < 0.001$ ). In multivariate analysis, these results were no longer significant.

**CONCLUSIONS:** The prevalence of VMIA was high in this elderly population in both glaucomatous and non-glaucomatous subjects. The information provided by macular optical coherence tomography (OCT) scans should be considered with caution when used for glaucoma management in elderly patients.

**Keywords:** Glaucoma, Population-based Study, Spectral-Domain Optical Coherence Tomography, Vitreomacular Interface



POSTER ABSTRACTS

P-074

Multimodal imaging of choroidal and vitreal metastasis secondary to breast cancer

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**OBJECTIVE:** To report multimodal imaging findings in a woman with choroidal and vitreal metastasis secondary to breast cancer.

**MATERIAL-METHODS:** Observation: A 28-year-old woman presented with blurred vision in her right eye. She had undergone mastectomy for left breast cancer and a systemic chemotherapy but she had bone and lung metastasis. Visual acuity was 1/20 in the right eye and 10/10 in the left eye. Slit-lamp examination of the anterior segment was normal. Right fundus examination showed a large yellowish macular elevation with many brown pigments and serous macular detachment, papillary edema with white agglomerate regarding optic disc. Wide field fluorescein angiography showed a subretinal tumor that was hyperfluorescent with hypofluorescent patches and choroidal neovascularization on the superior edge of the lesion, ICG angiography showed the tumor as a hypofluorescent area at early and middle stages and two hypofluorescent asymptomatic metastasis in the left eye. Swept source OCT showed the irregular or "lumpy bumpy" anterior surface of the lesion, serous retinal detachment and hyper-reflective dots. The diagnosis of choroidal and vitreal metastasis was established. The patient died after 2 months.

**RESULTS:** Choroidal metastasis are the most frequent malignancy of the eye. A history of systemic cancer was frequently found. Optical coherence tomography allows to visualize specific patterns associated with choroidal metastasis.

**CONCLUSIONS:** Multimodal imaging of choroidal and vitreal metastasis is very important for the diagnosis and the monitoring of the effectiveness of the therapies but patients with ocular metastases tend to have limited life expectancy.

**Keywords:** choroidal metastasis, vitreal metastasis



POSTER ABSTRACTS

P-075

The association between age and gender on vitreomacular adhesion and pathological conditions on the vitreomacular interface

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**OBJECTIVE:**To determine the association between gender and age on vitreomacular adhesion (VMA), vitreomacular traction (VMT), epiretinal membrane (ERM), lamellar macular hole (LMH) and full-thickness macular hole (FTMH).

**MATERIAL-METHODS:**The 2nd Tromsø Eye Study conducted in 2015-2016, is a sub-study of The Tromsø Study, a longitudinal population-based study in the municipality of Tromsø, Norway. Of the 13304 invited subjects 8346 participated (63%). Optical coherence tomography (Cirrus HD-OCT Carl Zeiss Meditec) was performed. Scans were evaluated for VMA, VMT, ERM, LMH and FTMH (Table1). The association of age and gender was evaluated by logistic regression.

**RESULTS:**So far scans from 2802 participants are graded, 2732 participants had bilateral gradable scans. Due to poor quality 28 scans were excluded and 51 scans were missing resulting in 2771 gradable right and 2755 left eye scans. In total, 1505 females and 1296 males aged 40-84 years participated. The mean age was 63 years for both sexes. The prevalence of VMA, VMT, ERM, LMH and FTMH was 48.1%, 2.0%, 7.8%, 1.5% and 0.1%, respectively (Table2). For VMA the OR for males was 1.4 (CI95% 1.20- 1.63) compared to females, decreasing frequency with increasing age. The prevalence of VMT increases significantly with age (OR 1.11 CI95% 1.07-1.15) though without gender difference. For ERM there was no significant gender difference, but a significant increase with age (OR 1.08, CI95% 1.106-1.11). Regarding LMH and FTMH there was no significant influence of gender or age.

**CONCLUSIONS:**In this material VMA is more common in men than women and decreases with age. VMT and ERM increase with age without gender difference. For LMH and FTMH low numbers might affect the lack of influence of age and gender.

**Keywords:** Vitreomacular interface, VMA, VMT, ERM, LMH, FTMH



POSTER ABSTRACTS

P-076

Prognostic factors of functional outcomes in idiopathic epiretinal membrane surgery

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**OBJECTIVE:**The aim of our study was to evaluate prognostic factors of functional outcomes in idiopathic epiretinal membrane (ERM) surgery.

**MATERIAL-METHODS:**We retrospectively studied 41 eyes of 39 patients who underwent surgery for idiopathic ERM. Ophthalmic evaluation included best-corrected visual acuity (VA), metamorphopsia, biomicroscopy and spectral domain optical coherence tomography (SD-OCT) before and after surgery. Status of the ERM, vitreomacular interface, foveal contour, retinal layers, choroid and effects of membrane peeling were assessed.

**RESULTS:**After a mean follow-up of 13.2 months, the best VA increased from  $0.88 \pm 0.35$  logMAR to  $0.35 \pm 0.29$  logMAR ( $P < 0.001$ ) with an improvement of visual acuity in 97% and a maximum of gain achieved between 3 and 6 month. Metamorphopsia decreased from 90% to 51%, and central macular thickness decreased of  $123.9 \mu\text{m}$  ( $P < 0.001$ ). Nine eyes (22%) showed restored foveal depression after surgery ( $P = 0.02$ ). Baseline VA ( $p = 0.001$ ), duration of symptoms ( $p = 0.001$ ), the integrity of photoreceptor's layers and cystic macular edema ( $p < 0.001$ ), influenced significantly the visual outcomes. Prognostic factors for the postoperative metamorphopsia, were baseline metamorphopsia ( $p < 0.001$ ), the duration of symptoms ( $p < 0.001$ ), central foveal thickness at 3 months postoperatively, retinal contraction and development of a lamellar macular hole ( $p = 0.017$ ). Whereas, gender, age, surgery, type and thickness of the ERM or foveal contour changes, had no significant influence on patient outcome.

**CONCLUSIONS:**Idiopathic ERM is the most common vitreomacular interface pathology in elderly population. Surgery leads to favorable functional outcomes but most cases do not recover normal microanatomy. The most predictive factors of visual outcomes after surgery are essentially clinical but also tomographic including the central foveal thickness and the degree of retinal contraction. These results may encourage an early management of these idiopathic ERM.

**Keywords:** Idiopathic epiretinal membrane, functional outcomes



POSTER ABSTRACTS

P-077

Sub-retinal pigment epithelium multilaminar hyperreflectivity at the onset of type 3 macular neovascularization

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**OBJECTIVE:**To report the prevalence and treatment outcomes of eyes with sub-retinal pigment epithelium (sub-RPE) multilaminar hyperreflectivity at the onset/clinical detection of type 3 macular neovascularization (MNV) secondary to exudative age-related macular degeneration (AMD).

**MATERIAL-METHODS:**Retrospective analysis of consecutive patients diagnosed with type 3 MNV secondary to AMD was performed. Eyes presenting with sub-RPE multilaminar hyperreflectivity on structural optical coherence tomography at the onset of type 3 MNV were included in this study. An age-, sex- and stage-matched control group was composed of eyes affected by type 3 MNV without sub-RPE multilaminar hyperreflectivity. Prevalence and treatment outcomes after anti-vascular endothelial growth factor (VEGF) injections at 1-year follow-up were analyzed in both groups.

**RESULTS:**Nineteen treatment-naïve eyes of 19 patients (8 male/11 female, mean age 83±8 years old) presenting with sub-RPE multilaminar hyperreflectivity prior to or at the onset/clinical detection of type 3 MNV were included from a cohort of 162 eyes with treatment-naïve type 3 MNV. This accounts for an estimated prevalence of 11.7%(5.8-15.2, 95% confidence intervals). No significant differences were disclosed between cases studied and control group (20 eyes of 20 patients) in age, sex, stage of disease, best-corrected visual acuity (BCVA) at baseline and number of injections. BCVA did not improve during the 1-year follow-up in patients showing sub-RPE multilaminar hyperreflectivity (p=0.47), whereas BCVA significantly increased in the control group (p=0.001). The presence of sub-RPE multilaminar hyperreflectivity in the context of type 3 MNV was significantly associated with regressive calcific drusen (p<0.001) and multiple type 3 lesions (p=0.0001).

**CONCLUSIONS:**The detection of multilaminar hyperreflectivity at the onset/clinical detection of type 3 MNV suggests that chronic exudation (i.e. the "onion-sign") in the sub-RPE space (i.e. focal sub-RPE neovascularization) may precede the onset/clinical detection of type 3 MNV.

**Keywords:** Age-related macular degeneration; onion sign; regressing drusen; type 3 neovascularization; retinal angiomatous proliferation; optical coherence tomography



POSTER ABSTRACTS

P-078

The SAFODEX 2 study. Long-term incidence and Risk Factors of Ocular Hypertension

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**OBJECTIVE:**To analyze the incidence, risk factors and time of appearance of ocular hypertension (OHT) after intravitreal injection (IVI) of Dexamethasone implant (DEX-I) and to evaluate the long-term cumulative probability of intraocular pressure elevation with the DEX-I.

**MATERIAL-METHODS:**In the SAFODEX study, all the consecutive eyes of patients who received at least one DEX-I IVI between October 2010 and February 2015 were included. We extended the follow-up by 2.5 years of this observational, retrospective, multicenter series. OHT was defined as an IOP greater than 25mmHg or an IOP increase of more than 10 mmHg.

**RESULTS:**Four hundred ninety-four eyes of 410 patients were studied. Mean age was 67.7 (10;104). Among 1371 intravitreal injections, incidence of OHT was 32.6% for injected eyes with a mean and median follow-up period of 30 months (min-max, 3-62.5) of which 75% had an observed follow-up period of more than 3 years. An IOP more than 25mmHg was present in 21%. Mean number of IVI by patients was 2.2 (1;19). Hypotensive treatment has been introduced in 36.9 % of the eyes. Young age, male sex, uveitis and vein occlusion, glaucoma treated with a double or triple topical hypotensive medications and an axial length of more than 25mm appear to be risk factors for ocular hypertension secondary to intravitreal dexamethasone injections. The incidence of OHT does not increase nor diminish, along with the increase in the number of intravitreal injections, with no cumulative effect ( $p=0.248$ ).

**CONCLUSIONS:**This long-term safety study of DEX-I IVI seems to confirm that OHT is of moderate incidence, transient, controlled by topical treatment and displays well-defined predictive criteria. This real-world study provides data about the long-term cumulative probability of IOP elevation in a large cohort of eyes treated with DEX-I IVI. Repeated injections of the DEX-I do not increase, nor do they diminish, the risk of OHT.

**Keywords:** Corticosteroid, Dexamethasone implant, side effects, glaucoma, intraocular hypertension





POSTER ABSTRACTS

P-079

Retinal Functional Changes in Treated and Fellow Eyes Following Nano-Pulse Laser Treatment for Intermediate AMD: An Epigenetic Effect?

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**OBJECTIVE:**To assess retinal functional changes in treated and untreated fellow eyes following nano-pulse laser treatment for intermediate AMD.

**MATERIAL-METHODS:**Monocular subthreshold nano-pulse laser treatment was delivered around the macula in 30 eyes of 30 patients diagnosed with intermediate AMD according to current classification. Clinical follow-up duration was 3 months. Best corrected ETDRS visual acuity (BCVA), Ganzfeld mixed rod-cone and cone-mediated electroretinograms (ERGs) and retinal imaging (autofluorescence and OCT) were recorded at baseline, 1 and 3 months post-treatment.

**RESULTS:**Compared to baseline, mean visual acuity of treated eyes improved by 2 letters at 1 and 3 months, whereas no changes were found in fellow eyes. Mixed rod-cone and cone-rod ERGs b-waves of treated and fellow eyes improved at 1 month by 25% and 20% ( $p < 0.01$ ), respectively. At 3 months, the increase of ERGs b-waves of treated eyes remained unchanged ( $p < 0.01$ ) compared to baseline, whereas ERGs b-waves of untreated fellow eyes returned to the original baseline values. Functional improvements were not always accompanied by a reduction of drusen load compared to baseline.

**CONCLUSIONS:**Nano-pulse laser treatment for AMD had a beneficial effect on retinal function, with ERG changes persisting at 3 months in the treated eyes and transitory in fellow eyes. These results support the hypothesis of transient molecular changes in the outer retina driven, as already shown by experiments in human retinal pigment epithelial (RPE) cell cultures, in human RPE-Bruch's-choroid explants and in animal models, by epigenetic control of the expression of matrix-metalloproteases.

**Keywords:** 2RT, Nano-Pulse Laser Treatment, AMD



POSTER ABSTRACTS

P-080

The unsuspected intrinsic property of melanin to dissociate the water molecule, implications in the context of the biology of the Macula

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**OBJECTIVE:**The incidence and prevalence of the first three causes of blindness in the world have not changed at least in the last 60 years. So, the treatments aren't working.

From 1990 to 2002 we conducted an observational study on the anatomical changes of the optic nerve vessels and their correlation with glaucoma, diabetes and macular degeneration.

**MATERIAL-METHODS:**Fluorescein angiography studies of 6000 patients were included. The main variable in study was the morphology of the blood vessels of the optic nerve, But a few weeks after the study started the constant presence of melanin around the optic nerve was reason to include melanin as a variable in study.

**RESULTS:**Melanin was always present near the optic nerve in the 6000 patients studied. The presence of melanin seems to oppose the development of blood vessels. A greater amount of melanin lower number of blood vessels and vice versa.

**CONCLUSIONS:**Nature only insists on important things. Melanin around the optic nerve in 6000 patients means that is very important to nature and therefore to biology.

A greater amount of melanin means lower number of blood vessels and vice versa.The solar filter function of the melanin that absorbs the excess light that enters the eye does not explain its substantive antiangiogenic effect. In the laboratory we detect significantly elevated oxygen levels in the pigmented tissues. The higher the amount of melanin, the higher the oxygen levels and vice versa. Oxygen levels explains the antiangiogenic effect of melanin. After exploring several possibilities we detect that melanin can dissociate the molecule of water, such as chlorophyll in plants. Melanin allows the ocular tissues to capture energy from the light, which implies a revolution in the biology of the retina and the macula.

Melanin as a source of energy means a new era in ophthalmology.

**Keywords:** Melanin, Macula, Retina, Energy, Water dissociation, Chlorophyll.



POSTER ABSTRACTS

P-081

Human iPS-derived retinal Müller glia cells to model diabetic retinopathy

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**OBJECTIVE:**Diabetic retinopathy (DR) remains the first cause of visual loss in the age-working population in industrialized countries. Growing evidences indicate that Müller glia cells (MGCs) activation is involved in DR formation and may occur early, even before any vascular changes. Glucose may not be the only factor leading to inflammatory and vascular changes in DR, and recent studies demonstrated the role of dyslipidemia and fatty acids in this disease. We aimed to investigate MGCs inflammatory and angiogenic response to high glucose and high lipid exposure. **MATERIAL-METHODS:**In this work, we described for the first time the production of Müller cells from reprogrammed induced pluripotent stem iPS (hiMGCs) from different origins, and assayed their response to DR-relevant stress to evaluate their potential use in disease modeling approaches.

hiMGCs were exposed to high glucose concentration (HG) or palmitic acid (Pal) for 24h. The production of pro-angiogenic factors and pro-inflammatory cytokines by cultured iPS-Müller cells were determined by quantitative RT-PCR and by ELISA (Qiagen) of the media.

**RESULTS:**Using a transcriptomic approach, we showed that unstimulated hiMGCs express 18 key MGCs proteins at similar levels to post-mortem human retina. Similar to primary MGCs, hiMGCs poorly respond to glucose but respond to high lipid exposure by up-regulating their inflammatory and angiogenesis reactions. Finally, we showed that PA stimulated hiMGCs secrete angiogenic factors related to DR such as VEGF, IL-8, IL-1 $\beta$  and ANGPTL4 and have a pro-angiogenic activity ex-vivo.

**CONCLUSIONS:**hiMGCs represent an extremely valuable tool to better understand mechanisms of complex diseases and for the development of new therapeutics. In particular, hiMGCs can be generated from donors and easily expanded to be used in high-throughput drug screens.

**Keywords:** diabetic retinopathy, Müller glial cells, induced pluripotent stem cells, dyslipidemia, angiogenesis, inflammation



POSTER ABSTRACTS

P-082

A Vision Enhancement System to Improve Face Recognition with Central Field Loss

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**OBJECTIVE:** To validate the proof-of-concept of a new visual aid using gaze-contingent visual enhancement with AMD patients during a face recognition task.

**MATERIAL-METHODS:** 15 individuals with binocular central field loss from AMD (mean age =  $79 \pm 7$ , mean acuity =  $0.66 \pm 0.16$ ) were recruited and tested on a face pairing task. On each trial, a test face was surrounded by 8 reference faces, among which, only one matched the test face. Participants were asked to explore the screen until they can report which reference face matched the test face. During the visual enhancement condition and at any moment while exploring the screen, a simple button press would allow the participant to magnify the fixated face. The enhanced face would be enlarged to fit the entire screen until the participant would decide to revert to normal viewing by releasing the button. During the natural exploration condition, participants also performed the pairing task but without the visual aid. Response time and accuracy were analyzed to: 1- compare the performance with and without visual aid; 2- estimate any speed-accuracy tradeoff.

**RESULTS:** On average, the percentage of correct response for the natural exploration condition was 45%. This value was significantly increased to 64% with visual enhancement ( $p < 0.001$ ). For the large majority of our participants (73%), this improvement was accompanied by very little increase in response time, showing relatively little speed-accuracy tradeoff.

**CONCLUSIONS:** Our system significantly improved face identification accuracy by 19%, proving to be helpful under lab conditions. Future steps to make this visual aid optimal for daily use will include (1) its implementation in a portable and affordable device and (2) the customization of its parameters using individual results from microperimetry examination.

**Keywords:** face recognition, central vision loss, AMD, visual aid, microperimetry



POSTER ABSTRACTS

P-083

Phenotype of Central serous chorioretinopathy in female

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**OBJECTIVE:**The aim of this study is to investigate if the phenotype of Central serous chorioretinopathy (CSCR) in female differs from male comparing risk factors, multimodal imaging and evolution. **MATERIAL-METHODS:**Multicentric retrospective study analyzing all female presenting with a confirmed diagnosis of CSCR in Ophtalmopôle of Paris and Jules Gonin Eye hospital in Lausanne without any other concomitant eye disease. A control group of men diagnosed with CSCR was included consecutively. The two groups were compared in terms of age, risk factors, subtype and evolution of the disease, clinical examination, multimodal imaging. **RESULTS:**Datas of 53 women and 50 men were reviewed. Female were significantly older than male with a mean age of 53 years old versus 47 years old (p-value = 0,001). Almost 57% of female were menopause. The use of corticosteroids was significantly more frequent in females with 60% versus 29% in male (p-value < 0,001). At the opposite, shift work was more frequent in male in 33,3% versus 11,4% (p-value = 0,002). In female, 65,4% of CSCR were chronic or persistent as compared 51,2% in male, who were more frequently acute (P-value = 0,051). CSCR seems to be more unilateral in female (90,5% vs 76,6%). The sub-retinal detachment in female was predominantly subfoveal with less involvement of the mild periphery or peripapillary area in 79% in female versus 58% in male (p-value = 0,019). In chronic CSCR in women, gravitational tracks are rarely observed. **CONCLUSIONS:**In female, CSCR occurs at older age, is more frequently unilateral, chronic and subfoveal. Our results also suggest that in female, two distinct phenotypes are identified: a typical acute form mostly associated to corticoid intake; a chronic unilateral subfoveal SRD with a higher rate of CNV in post-menopause female. The frontier between the later form and pachychoroid neovascularopathy can be challenging without previous history of CSCR  
**Keywords:** Central serous chorioretinopathy. multimodal imaging.



POSTER ABSTRACTS

P-084

SS-OCTA in the diagnosis and follow-up of CNV secondary to MEWDS treated by intravitreal Ranibizumab

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**OBJECTIVE:**To describe the qualitative and quantitative swept-source optical coherence tomography angiography (SS-OCTA) findings at baseline and during the follow-up of choroidal neovascularization (CNV) secondary to multiple evanescent white dot syndrome (MEWDS) treated by intravitreal injections of Ranibizumab (IIR). **MATERIAL-METHODS:**The clinical course, conventional multimodal imaging (MMI) findings including fundus color photography, fundus autofluorescence (FAF), spectral domain optical coherence tomography (SD-OCT Spectralis, Heidelberg Engineering, Heidelberg, Germany), fluorescein angiography (FA, Heidelberg Engineering, Heidelberg, Germany), indocyanine green angiography (ICGA) and SS-OCTA (Plex-Elite, Carl Zeiss Meditec, Inc., Dublin, CA) findings at baseline and during the follow-up of a patient with CNV secondary to MEWDS were analyzed. CNV area and vessel density (VD) of en face images were measured and analyzed with ImageJ software (National Institutes of Health, Bethesda, MD). **RESULTS:**A 21-year-old woman presented with an acute visual decline of the right eye. She had no systemic history and an ocular history of myopia. Her best corrected visual acuity (BCVA) was 20/32 in the right eye and 20/20 in the left eye at baseline. Funduscopic examination and MMI revealed a diagnosis of MEWDS, complicated by an active foveal type 2 secondary CNV. SS-OCTA showed a high flow neovascular network consistent with conventional MMI. SS-OCTA did not reveal flow anomalies in the choriocapillaris segmentation within the dots. The patient was treated with monthly IIR and the neovascular lesion demonstrated morphological remodeling during the follow-up on SS-OCTA. The CNV area showed fluctuations over time whereas VD was constantly increasing. **CONCLUSIONS:**SS-OCTA is able to detect CNV secondary to MEWDS at baseline and during the follow-up. No choriocapillaris involvement was detected on SS-OCTA. Secondary CNV in the setting of MEWDS showed vascular remodeling on SS-OCTA and the quantitative analysis showed CNV area fluctuations associated with a progressive increment of VD under IIR treatment.

**Keywords:** Choroidal neovascularization, multimodal imaging, multiple evanescent white dot syndrome, MEWDS, OCTA.



POSTER ABSTRACTS

P-085

Transient hyperautofluorescence in toxoplasmic retinitis: a new clinical sign of retinal inflammation ?

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**OBJECTIVE:**Very little is known about autofluorescence in toxoplasmic retinitis. Therefore we measured autofluorescence of toxoplasmic retinitis.

**MATERIAL-METHODS:**Cases of toxoplasmic retinitis from La Croix-Rousse Lyon Hospital and Centre ophtalmologique de l'Odéon in Paris were included retrospectively from June 2008 to September 2018. Inclusion criteria were acute toxoplasmic retinitis and multimodal imaging including autofluorescence. Exclusion criterion was autofluorescence being unavailable because of vitritis.

**RESULTS:**Data from 31 patients were collected. 4 patients were excluded because of autofluorescence unavailable due to intense vitritis. 14 patients showed hyperautofluorescence spots around the retinitis focus. Hyper-autofluorescent spots were transient, well defined, multiple, hypo-fluorescents in late ICG angiography and isofluorescent in fluorescein angiography.

OCT showed a disruption of the ellipsoïde zone, but there was no decreased choriocapillary flow in OCT angiography of the spots. 13 patients had no spots.

Vasculitis and papillitis happened more often in cases with hyper autofluorescent spots than in cases without such spots. Patients with spots were younger and more slightly myopic than those without spots.

**CONCLUSIONS:**Hyperautofluorescent is explained whether by the accumulation of fluorophores, whether by the diminishing of the chromophores filter. Photobleaching artificially lowers the chromophore filter. Therefore, disappearing of spots after photobleaching rules out the accumulation of fluorophores.

Spots are transient and do not lead to atrophy. The underlying choroid seems normal as shown by the normal flow using OCT-Angiography and the lack of hypo fluorescence in early ICG angiography.

The transient hyperautofluorescent spots seems to be a transient disorder of external retina without choroidal involvement, that happens during intense posterior inflammation, as shown by vasculitis and papillitis, in patients sharing the same characteristics with patients having white-dot syndromes in the published literature. Toxoplasmic retinitis seems to be able to trigger a transient outer retinal inflammation without any choroidal involvement, in predisposed eyes, that shares some common features with MEWDS.

**Keywords:** Toxoplasmosis, retinitis, autofluorescence



POSTER ABSTRACTS

P-086

Choroidal structural changes in patients with Birdshot Chorioretinopathy

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**OBJECTIVE:**To assess choroidal changes in patients with birdshot chorioretinopathy (BSCR) by measuring the Choroidal Vascularity Index (CVI).

**MATERIAL-METHODS:**Design: Cross-sectional observational study Participants: Patients with BSCR and healthy controls.

**METHODS:** Patients were imaged with enhanced-depth imaging (EDI) OCT. The subfoveal choroidal area was segmented into the luminal area and stromal area. The CVI was defined as the ratio of Luminal area to the total subfoveal choroidal area. Intraocular inflammation was defined by the presence of macular edema and/or  $\geq 1+$  of vitritis and/or vasculitis and/or papillitis. Main outcome measures: CVI in BSCR and healthy control patients. Association between CVI and other ocular factors in patients with BSCR.

**RESULTS:** Eighty BSCR patients (155 eyes) and 22 (44 eyes) healthy controls were included in the study. Sub-foveal choroidal thickness (CT) was lower in the BSCR group compared with the control group (240.1  $\pm$  97.6 vs 303.6  $\pm$  78;  $p < 0.001$ ). CVI was not different between two groups (CVI mean: 67.5%;  $p = 0.9$ ). Sub-foveal CT was significantly higher in BSCR patients with signs of inflammatory activity compared with the inactive BSCR patients ( $p = 0.001$ ). CVI was significantly higher in the active BSCR compared with the inactive BSCR ( $p = 0.004$ ). Using multivariate linear regression model, longer disease duration was associated with lower CVI ( $p = 0.038$ ) whereas the presence of papillitis was associated with a higher CVI ( $p = 0.003$ ). **CONCLUSIONS:** The CVI may be a potential non-invasive tool for monitoring inflammatory activity in BSCR. Further longitudinal studies are warranted to corroborate the application of this tool in clinical practice.

**Keywords:** choroid, birdshot chorioretinopathy, choroidal vascularity index





POSTER ABSTRACTS

P-087

Antibiotic prophylaxis and intravitreal injections: impact on the incidence of acute endophthalmitis

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**OBJECTIVE:**To study the role of antibiotic prophylaxis in reducing the risk of acute endophthalmitis after intravitreal injections, in France, between 1 January 2012 and 31 December 2015.

**MATERIAL-METHODS:**The French national inter-scheme health insurance information system was used to estimate the incidence rate of acute endophthalmitis after intravitreal injection (IVT) at a national scale and its risk factors. The occurrence of acute endophthalmitis was sought within 42 days after the IVT. Its association with age, sex, diabetes, injected product, and topical antibiotic prophylaxis was analyzed by multivariate Poisson regression.

**RESULTS:**A total of 1,811,977 intravitreal injections were performed on 254,927 patients. Following 2014 French recommendations on the lack of indication of antibiotic prophylaxis when performing anti-VEGF IVTs, the proportion of IVT with antibiotic prophylaxis for anti-VEGF and corticosteroids from 2013 to 2015, dropped from 82.7% to 59.1% and 84.8% to 64.2%, respectively. Acute endophthalmitis occurred in 444 cases (incidence rate = 0.0245%). The number of endophthalmitis in the absence of antibiotic prophylaxis was 114 for anti-VEGF and 14 for corticosteroids. The time to onset of endophthalmitis did not differ according to the status of antibiotic prophylaxis. Univariate analysis on repeated data did not find any difference in risk depending on the status of antibiotic prophylaxis or therapeutic classes but increased risk of endophthalmitis for antibiotics associated with corticosteroids compared to antibiotics alone (IRR 1.67; 95% CI 1.08-2.57; P=.02). This variable did not remain significant in multivariate analyses.

**CONCLUSIONS:**These results are consistent with the literature. Endophthalmitis rates with or without antibiotic prophylaxis are similar. Avoiding antibiotic prophylaxis would reduce the costs as well as the risks of antibiotic resistance.

**Keywords:** Antibiotic prophylaxis, intravitreal injection, IVT, endophthalmitis



POSTER ABSTRACTS

P-088

Unusual cases of Uveal Metastatic Carcinoma

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**OBJECTIVE:**We report two different cases of metastatic clear-cell renal cell carcinoma masquerading as uveal melanoma. **MATERIAL-METHODS:**Two caucasian man with a history of renal cell carcinoma presented with 1 month of redness and unilateral vision loss. Anterior segment exam revealed atypical sentinel vessels penetrating the sclera. A non-pigmented choroidal mass with exudation, hemorrhage, and subretinal fluid was seen in the eye through the dilated pupil. **RESULTS:**One patient was treated with immunotherapy for brain metastasis incurred, thus, we decided to observe. Three months later, the patient presented a reduction of volume of the choroidal mass and a good systemic response. The other patient presented macular exudation with an important visual decline,thus, we decided to treat with a combination of local (photodynamic therapy) and systemic therapy. **CONCLUSIONS:**In patients with a known history of renal cell carcinoma, there should be a high index of suspicion for metastases when presenting with choroidal lesion, even if clinical signs suggest uveal melanoma. Photodynamic therapy improves functional outcome in a shorter time than systemic therapy.

**Keywords:** intraocular metastasis, choroidal metastasis, photodynamic therapy, clear-cell renal cell carcinoma, amelanotic lesion



POSTER ABSTRACTS

P-089

Infliximab therapy for idiopathic retinal vasculitis, aneurysm, and neuroretinitis syndrome

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**OBJECTIVE:**To report the effects of infliximab therapy, in treating 2 patients with IRVAN syndrome

**MATERIAL-METHODS:**Two patients with clinical diagnosis of IRVAN syndrome were included in the study. The visual acuity was affected due to ocular inflammation and presence of macular edema due to exudation around the optic nerve.

**RESULTS:**The patients did not respond to initial treatment with oral steroids, and visual acuity continued to deteriorate due to macular exudation. Infliximab therapy resulted in prompt resolution of the inflammatory reaction and retinal exudation, with improvement in visual acuity, that was subsequently maintained with maintenance therapy. The intravenous infliximab infusions were scheduled at 0, 4, 8, and 12 weeks initially, and every 2 months thereafter. Retinal neovascularization in each patient was managed by pan retinal photocoagulation.

**CONCLUSIONS:**Infliximab therapy may be useful in reducing inflammation and leakage from the optic nerve in patients with IRVAN syndrome. This may help preserve or improve visual acuity.

**Keywords:** retinal vasculitis, aneurysm, neuroretinitis, infliximab



POSTER ABSTRACTS

P-090

Neuro-protection in non-arteritic anterior ischaemic optic neuropathy - a choice of treatments

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**OBJECTIVE:.** Despite research to preserve vision in non-arteritic anterior ischaemic optic neuropathy, little is considered possible to prevent permanent visual loss and with a 'disc at risk' there is significant chance of contra-lateral eye involvement. The discussion centres around the acute presentation in the fellow eye of a 48 year old man who was diagnosed and treated with NAION only 8 months prior.

Neuro-protection and the most current evidence based knowledge on NAION to save sight will be reviewed.

**MATERIAL-METHODS:.** Retrospective case study and evidence based medicine literature review.

A systematic review was conducted to review EBM publications on NAION and neuro-protection, as well as review of this patient's records.

**RESULTS:-** This patient had cardiac surgery and was on anti-coagulants and statins prior to the second eye involvement 8 months later.

Early presentation of contra-lateral NAION with vision loss in his better seeing eye had occurred.

An immediate course of pulsed intra-venous followed by oral steroids, as well as a sequence of hyperbaric oxygen therapy was given and neuro-protective treatments available were initiated.

The remarkable visual outcome of this patient's second eye, in comparison to the first, over the recovery period is documented.

This will be discussed in view of concurrent combination treatments for NAION, which was guided by then current EBM data relating to neuro-protection and NAION, also mentioning the most recent publications to date.

**CONCLUSIONS:-** NAION remains a devastating condition with significant visual morbidity, especially when contra-lateral eye involvement occurs.

Emergency and subsequent treatments with focus on the most complete neuro-protection for the best visual outcome, seems to be dependent on the immediacy of diagnosis and instituting treatment, while ensuring the patient's optimal systemic health.

This case study and current EBM guidelines highlight further research on neuro-protection in NAION and combination treatment is necessary.

**Keywords:** non-arteritic anterior ischaemic optic neuropathy, NAION, neuro-protection



POSTER ABSTRACTS

P-091

An Observational Study (TITAN) to Assess 12-Month Outcomes in Wet Age-Related Macular Degeneration Patients Refractory to Ranibizumab Who Switched to Intravitreal Aflibercept

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**OBJECTIVE:**To evaluate outcomes after early switch (12 months) from ranibizumab to intravitreal aflibercept (IVTAFL).  
**MATERIAL-METHODS:**TITAN was an observational study conducted in France. Patients with wet age -related macular degeneration (wAMD) refractory to ranibizumab (defined as persistent fluid despite treatment in accordance with the Haute Autorité de Santé recommendations in patients who received 3 but 12 ranibizumab injections within 12 months) were enrolled. Primary outcome (treatment success) was the percentage of patients who gained  $\geq 1$  Early Treatment Diabetic Retinopathy Study letter (best corrected visual acuity [BCVA]) and/or a reduction in central retinal thickness (CRT) from baseline to Month 12 after switch.  
**RESULTS:**Safety data (n=217) and effectiveness data from patients with BCVA and CRT assessments before ranibizumab, before switch (baseline), and at 12 months (n=135) were analysed. After switch, the mean (SD) number of IVTAFL injections was 6.9 (24) (all patients) and 8.2 (1.9) (patients who received a loading dose [first 3 injections within 45–90 days]) (n=71). The primary outcome was achieved in 66.7% (all) and 69.0% (patients with a loading dose). Mean (SD) change in BCVA (letters) was +1.7 (10.5) (all) and +3.3 (11.0) (patients with a loading dose) at 12 months. Ocular and nonocular treatment-emergent adverse events (AEs) were reported in 28.6% and 7.8% of all patients, respectively. The most common ocular AEs were lack of response (124%) and inappropriate schedule of drug administration (5.1%).  
**CONCLUSIONS:**These findings indicate that early switch to IVT-AFL (initiated with a loading dose) in patients refractory to ranibizumab may potentially achieve better outcomes.  
**Keywords:** macular degeneration



POSTER ABSTRACTS

P-092

Intravitreal gas injection for the treatment of symptomatic Vitreo-macular traction with or without macular hole. A retrospective analysis of 22 cases

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**OBJECTIVE:**Symptomatic vitreo-macular traction usually lead to vitreo-retinal surgery. Chemical vitreolysis is an expensive alternative with poor efficiency and may not be free of complications. Single intra-vitreous gas injection is an easy and costless alternative to remove vitreo-retinal tractions even with small macular holes (inferior to 400 µm). This study analyses the success and complication rate of a single intra-vitreous gas injection. **MATERIAL-METHODS:**A serie of 22 consecutive cases treated with a single injection of gas for vitreo-macular traction were retrospectively analysed. All patients had symptomatic vitreo-retinal traction with anatomic or fonctionnal aggravation after an observation period of 1 to 4 months. initially, 55% had pending or full thickness macular holes. All patients had a precise verification of peripheral retina before injection. An injection of 0.3 ml of C2F6 was made after in anterior chamber ponction in the same condition as all intravitreal injections corresponding to french authorities recommendations. Patients were asked to keep a non strict face-down position with lateral and up-down movements during 7 to 15 days. the follow-up range was 6 month to 2 years. **RESULTS:**The success rate was 77% (17/22) with anatomical and visual improvement. Mean visual gain was 27 letters. The unsuccessful eyes (23%) needed surgery because of failure or transformation in a macular hole. All operated patients were finally successful. Only one case of iatrogenic superior retinal tear was observed after gas resorption and successfully treated with laser. No retinal detachment were observed. **CONCLUSIONS:**Intravitreal gas injection for vitreo-retinal traction with or without small full thickness macular holes is an interesting alternative to surgery or chemical vitreolysis with a low cost, very low complication rate and no cataract induction. It may deserve a first line position in eyes without peripheral rhegmatogenous lesions and specially in phakic eyes. **Keywords:** vitreomacular traction, macular hole, pending macular hole, intravitreal gas injection



POSTER ABSTRACTS

P-093

PDT associated with ANTI VEGF in refractory cases of subretinal membranes previously treated with anti-VEGF

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OBJECTIVE: This work Shows that PDT associated with AntiVEGF is a promising treatment for Macular wet degeneration

MATERIAL-METHODS: we present here a series of 8 cases previously submitted to several injections of anti-VEGF medication for a period of more than one year and were no longer responding and then submitted a one PDT using Visudyne and after that, the injection treatment were retake

RESULTS: 7 patients presented better visual relative after 60 days and all 8 show absorbed total subretinial liquid after 30 days.

CONCLUSIONS: PDT showed to be an important coadjuvante in the treatment of amd mainly in cases in which injections show no more therapeutic response all 8 patients inform better vision after 60 days and completely sub retinal liquid absorption.

Keywords: PDT, Visudyne, photodynamic therapy, macular degeneration



POSTER ABSTRACTS

P-094  
Retina Fold Surgery

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OBJECTIVE: Showing the surgical technique to undo macular retinal fold

MATERIAL-METHODS: we present a case of macular retinal fold after vitrectomy surgery with gas and pronation position that resulted in a retina fold fold in the macular region causing a bad vision

RESULTS: After performing a new surgery with BSS injection in the sub macular space with a 41 gauge cannula, we undo the retinal fold and keep the retina detachable. in pos operator. After 48 hours, the retina was attached and patient palreada related a better vision. The vision was 20/40 after 20 days of the surgery

CONCLUSIONS: we showed a simple surgery to undo macular fold with excellent final acuity Photos and video will be attached

Keywords: macular fold, surgery, retinal detachment





POSTER ABSTRACTS

P-095

Cellular resolution retinal pigment epithelium imaging with transscleral optical phase imaging (TOPI)

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**OBJECTIVE:** Retinal diseases are the major cause of blindness in industrialized countries. A forecast reported that an estimated number of 196 millions people will be affected by age related macular degeneration by 2020. While tremendous effort is made to develop novel therapeutic strategies to rescue retinal neurons and retinal pigment epithelium (RPE), optimal means to evaluate the effects of such treatments and diagnose the disease are still missing. **MATERIAL-METHODS:** We developed an imaging modality, called transscleral optical phase imaging (TOPI), which is able to resolve the individual human RPE cells in-vivo with the help of adaptive optics. Thanks to the approval from the ethic committee (CER-VD N°2017-00976), we conducted a study on 7 healthy human participants, with different skin color, 3 men and 4 women having an average age of 26 years.

**RESULTS:** We show the RPE density and area analysis for 7 healthy subjects. The results of the analysis exhibits comparable values as the ones found in the literature.

**CONCLUSIONS:** The results of the study on healthy subjects demonstrate that TOPI is able to image and quantify in-vivo the human RPE cells, within a time frame of a few seconds (typically 2 seconds). This makes the technology easily transferable to clinics.

**Keywords:** Retinal imaging, Retinal pigment epithelium, adaptive optics, transscleral illumination



POSTER ABSTRACTS

P-096

Restoration of Sight in Geographic Atrophy using a Photovoltaic Subretinal Prosthesis

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**OBJECTIVE:**To evaluate feasibility of restoration of central vision in patients with age-related macular degeneration using a wireless photovoltaic subretinal implant. In particular, to assess safety of sub-retinal implantation and quality of prosthetic vision in patients with geographic atrophy.

**MATERIAL-METHODS:**A prospective study in 5 patients with visual acuity  $\leq 20/400$  due to geographic atrophy of at least 3 optic discs diameters and no foveal perception. Wireless photovoltaic chip (PRIMA, Pixium Vision) is 2x2mm in size, 30 $\mu$ m in thickness, containing 378 pixels of 100 $\mu$ m in width. Each pixel converts pulsed near-infrared light (880nm) projected from video-goggles into electric current to stimulate nearby neurons in the inner retina nuclear layer. Several surgical techniques used, varying in anesthesia (local vs. general) and retinal reattachment (gas vs. oil)

**RESULTS:**In all patients, surgery lasted approximately 2 hours, chip was successfully implanted under the macula and remains stable, with a follow-up extending now to 11 months in first patient. In 3 patients chip was placed into a desired position-centrally and close to the inner retina. In 2 patients the implant ended up in suboptimal positions—one in the choroid and another off-center. All 5 patients perceive white-yellow patterns with adjustable brightness, in retinotopically correct locations within previous scotomata. No decrease in natural visual acuity was observed in any patient. All 4 patients with subretinal chip placement correctly identify bar orientation, with 93.5 $\pm$ 3.8% accuracy. Out of them, all 3 patients with central placement of the implant demonstrated visual acuity with Landolt C test in the range of 20/460-20/550, which is just 15-35% below the theoretical resolution limit for this pixel size (20/400). Patients are now being tested in letter recognition, reading, and other visual tasks.

**CONCLUSIONS:**Wireless chip PRIMA can be safely implanted under the atrophic macula in patients with geographic atrophy and restore central visual perception with acuity close to the theoretical limit of the implant. Implantation did not reduce the natural residual visual acuity of the patients. Implants with smaller pixels are being developed.

**Keywords:** age-related macular degeneration; subretinal chip; photovoltaic; vitrectomy; geographic atrophy



POSTER ABSTRACTS

P-097

Interaction between the Pantone-Valentine toxin of *Staphylococcus aureus* with the retinal cells in an endophthalmitis model in the rabbit

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**OBJECTIVE:**The purpose of the study is to understand the mechanisms of interaction between the Pantone-Valentine toxin of *Staphylococcus aureus* and the retinal cells in an endophthalmitis model in the rabbit.

**MATERIAL-METHODS:**An endophthalmitis model has been developed to study the early effects of the Pantone-Valentine toxin of *Staphylococcus aureus* on the retina. An intravitreal injection of the purified toxin has been performed in the eye of a rabbit, without injection of the bacteria. Early retinal damage caused by the toxin were evaluated after 2h, 4h, 8h and 24h after injection of the toxin.

**RESULTS:**The toxin targets the retinal ganglion cells of the retina which express the transmembrane receptor of the toxin: the complement receptor of the C5a (C5aR). The toxin induces a retinal inflammation with the production of cytokines (interleukin-6). The toxin is responsible for glial and microglial activation which is highlighted by an increase in the expression of GFAP (Glial Fibrillary Acidic Protein) in the Muller cells and the microglia. The TUNEL procedure (Terminal deoxynucleotidyl transferase dUTP nick end labeling) shows that some microglial cells undergo apoptosis after incubation with the toxin. An increased amount of nitrotyrosinylated proteins has been measured in the retina after toxin injection, which suggests that the toxin induces an oxidative stress derived from nitric oxide (NO). A fluorescent probe (MitoSOX red) displaying the production of the superoxide radical showed that the toxin also induces oxidative stress through the production of reactive oxygen species (ROS).

**CONCLUSIONS:**The Pantone-Valentine toxin of *Staphylococcus aureus* induces early retinal damage during the course of an endophthalmitis. The lesional mechanisms identified for now encompass the production of inflammatory cytokines, oxidative stress and apoptosis. The toxin could be a therapeutic target to prevent the advent of severe retinal sequelae during an endophthalmitis

**Keywords:** endophthalmitis, Pantone-Valentine leucocidine, *Staphylococcus aureus*, retina



POSTER ABSTRACTS

P-098

Polypoidal choroidal vasculopathy: Diagnosis & management. Recommendations of the France Macula Federation.

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**OBJECTIVE:**To update the medical literature on the diagnostic and therapeutic approach to polypoidal choroidal vasculopathy (PCV) and to propose a treatment algorithm in agreement with French market approval, supported by the France Macula Federation (FFM).

**MATERIAL-METHODS:**Literature review and expert opinion.

**RESULTS:**The diagnosis of PCV is based on multimodal imaging, including indocyanine green angiography (ICGA), which is considered the gold standard for the diagnosis of PCV. Regarding the therapeutic management of PCV, the FFM recommends treating PCV first-line either by monotherapy with intra-vitreous anti-vascular endothelial growth factor (anti-VEGF) injections, or by a combined treatment of photodynamic therapy (PDT) with Verteporfin and intra-vitreous anti-VEGF injections, depending on the location of the PCV.  
**Keywords:** Polypoidal Choroidal Vasculopathy; Photodynamic therapy (PDT); Anti-VEGF; Optical coherence tomography; Indocyanine green angiography (ICGA)



POSTER ABSTRACTS

P-099

Optical Coherence Tomography Angiography of Retinal Artery Occlusion

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**OBJECTIVE:** To evaluate retinal vascular layers in Retinal Artery Occlusion (RAO) imaged by Optical Coherence Tomographic Angiography (OCTA).

**MATERIAL-METHODS:** A series of 3 eyes of three patients with RAO were enrolled in an observational case series study. RAO was defined as symptoms as sudden visual loss, retinal whitening, and on OCT B-scan, inner retinal intracellular edema with disruption of the retinal layers. OCTA cube scans were acquired using the RTVue-XR Avanti AngioVue, with Split-Spectrum Amplitude-Decorrelation Angiography algorithm, and motion correction technology. Images of the superficial and deep capillary plexuses were analyzed and compared with structural Optical Coherence Tomography (OCT).

**RESULTS:** OCTA findings were as decreased vascular perfusion in both the superficial and deep capillary plexuses corresponding to the areas of the inner retinal changes on OCT B-scan and fundus changes. Only large vessels were imaged. No vascular flow was observed in area nourished by the microvascular bed.

**CONCLUSIONS:** OCTA is a useful diagnostic tool used to demonstrate the features necessary to diagnose RAO. Compared to FA, OCTA is fast, noninvasive, and can provide improved visualization of microvascular details.

**Keywords:** Central Retinal Artery Occlusion (CRAO), Branch Retinal Artery Occlusion (BRAO), Optical Coherence Tomographic Angiography



POSTER ABSTRACTS

P-100

Effects of Topical Anesthesia on Image Quality of Optical Coherence Tomography Angiography: A Contralateral Eye Study

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**OBJECTIVE:**To compare the effects of topical anesthesia on image quality and artifacts of Optical Coherence Tomography Angiography (OCTA).

**MATERIAL-METHODS:**In an interventional case series, OCTA was performed in both eyes. In the right eye of all cases, Tetracaine eye drop was applied. To compensate learning effect on cases cooperation, half of the cases had undergone OCTA first on right eye after Tetracaine drop, and others first the left eye without any intervention. OCTA cube scans (3×3 mm) were acquired using the RTVue-XR Avanti AngioVue, with Split-Spectrum Amplitude-Decorrelation Angiography algorithm, and motion correction technology. Number of horizontal and vertical saccadic, blink, and stretch artifacts and also signal strength of the images were recorded. Moreover, pain and discomfort based on subjective score was recorded as overall discomfort and discomfort experienced by blue focus light and red scanning laser. **RESULTS:**Nineteen cases were included from female nurses of ophthalmology department. Discomfort by blue light, red light and overall pain experience by the cases were less in the anesthetized eye (p values = 0.018, 0.035 and 0.013 respectively). Signal strength (p-value: 0.023) was different but horizontal and vertical saccadic artifacts, stretch and blink artifacts were not different.

**CONCLUSIONS:**Our study suggests that anesthetizing before OCTA may improve the image quality and may irritate less the patients. As OCTA capturing needs more cooperation and less blinking and attention to a point for a relatively long time, anesthetizing the eye may help patients cooperate more.

**Keywords:** Optical Coherence Tomography Angiography, Topical Anesthesia, Image Quality, Image Artifacts, Pain, Discomfort



POSTER ABSTRACTS

P-101

Performance of ultra-wide field retinophotography for screening of diabetic retinopathy

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**OBJECTIVE:**The screening of diabetic retinopathy is a public health issue. Fundus retinophotography (FRP) is the preferred method of detection of the disease. Recently, ultrawide field retinophotography (WFRP) device allow the covering of approximately 80% of the retinal surface in a single image. The aim of the present study was to evaluate the efficiency of WFRP in the diagnosis et the gradation of diabetic retinopathy compared to the gold standard FRP.

**MATERIAL-METHODS:**Non-mydratic Optos P200Tx was used for WFRP imaging. Photographies in the 9 cardinal positions of gaze were then acquired with Topcon TRC-NW6S after pupillary dilatation. The processing time for each imaging modality was recorded.

**RESULTS:**One hundred and sixteen eyes of 58 patients were included in this study. Fourteen eyes were excluded from analysis due to insufficient imaging quality. WFRP sensibility was 96% and specificity was 92%. Only 6 eyes received a higher severity grade of diabetic retinopathy in WFRP compared to FRP. For these photographs, when WFRP was analyzed in the same field than FRP, severity grade was similar for 5 of the 6 eyes. The mean time of acquisition was significantly lower for WFRP compared to FRP.

**CONCLUSIONS:**WFRP is fast and efficient in the screening of diabetic retinopathy. The severity grade of the disease was similar to the gold standard FRP in most cases. WFRP could e used in mass screening of diabetic retinopathy.

**Keywords:** Diabetic retinopathy, Mass screening, Retinophotography, Ultra-wide field



POSTER ABSTRACTS

P-102

Acute and convalescent changes in plasma homocysteine concentrations in branch retinal vein occlusion

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**OBJECTIVE:** Homocysteine is a potentially risk factor for branch retinal vein occlusion (BRVO), but this remains controversial. We measured fasting total plasma homocysteine (tHcy) concentrations immediately after BRVO and in the convalescent period to investigate this controversy.

**MATERIAL-METHODS:** We measured fasting tHcy concentrations in 42 consecutive patients with BRVO within three days of admission and at 1 month, 3 months and 6 months after BRVO and once in 42 control subjects. The vitamin B12, and folate levels and the presence of C677T MTHFR polymorphisms were analyzed in all patients and controls.

**RESULTS:** Median tHcy concentrations was not significantly higher than in matched control subjects in the acute phase of BRVO (10.27 [11.01±4.09] versus 9.31 [10.04±3.67]  $\mu\text{mol/l}$ ,  $P=0.257$ ). However, tHcy levels were a classical rise, reaching a peak on 1 month after BRVO and declining to normal values by 6 months after BRVO. In addition, the tHcy levels increased with increasing foveal center point thickness, and this correlation was significant at all time points. However, these observations did not appear to be explained by alteration in serum folate, vitamin B12 concentrations, and the MTHFR C677T genotype.

**CONCLUSIONS:** The tHcy levels are not immediately elevated after BRVO but transiently increase in the convalescent period. These data do not support the hypothesis that raised tHcy concentrations are an independent risk factor for BRVO. Instead, it is possible that changed tHcy levels may be caused by the disease process itself.

**Keywords:** Acute phase, convalescent period, branch retinal vein occlusion, MTHFR C677T, total plasma homocysteine





POSTER ABSTRACTS

P-103

High myopia in Stickler syndrome and in acquired non syndromic high myopia: comparison of clinical and SD-OCT characteristics

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**OBJECTIVE:** Stickler syndrome is a dominant autosomal hereditary vitreo-retinopathy due to mutations in genes coding vitreous fibrils of collagen. Most of patients present with congenital high myopia. Our aim was to compare the retinal, choroidal and peripapillary aspects in Spectral-Domain Optical Coherence Tomography (SD-OCT) between patients with Stickler syndrome and high myopic patients.

**MATERIAL-METHODS:** Patients with genetically-confirmed Stickler syndrome were included from tertiary eye care centers specialized in retinal diseases. Clinical characteristics and SD-OCT features of patients with Stickler syndrome were compared with age- and axial length-matched patients with high myopia (axial length >26mm) not suspected to have Stickler syndrome.

**RESULTS:** Among the patients with Stickler syndrome, the prevalence of high myopia was 62,7%. In all, 17 patients (26 eyes) with Stickler syndrome and high myopia (group 1) were compared to 19 patients (25 eyes) with non-syndromic high myopia (group 2). Retrofoveal choroidal thickness was significantly higher in group 1: 188,7  $\mu\text{m}$  ( $\pm$  72,8) against 126  $\mu\text{m}$  ( $\pm$  88,7) in group 2, ( $p=0,013$ ). In contrast, retinal thicknesses in the two groups were not statistically different.

**CONCLUSIONS:** We showed that patients with Stickler syndrome and high myopia had a thicker (or less atrophic) choroid than patients with isolated high myopia after matching on age and axial length, which are well known confounding factors. However, retinal thicknesses were not different. In conclusion, we could establish that patients with Stickler syndrome had a thicker choroid than non syndromic high myopic patients. It will be interesting to establish in future studies if this condition is related to a lower rate of retinal complications (apart from retinal detachment) than patients with non-syndromic high myopia.

**Keywords:** Stickler syndrome, high myopia, choroidal thickness



POSTER ABSTRACTS

P-104

Is face-down positioning still necessary in macular hole surgery ? A comparative retrospective study of 36 patients

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**OBJECTIVE:**Macular hole surgery, nowadays, calls for vitrectomy, internal limiting membrane peeling or flap and gas tamponade. This technique allows a primary closure rate greater than 90%. Patients are often asked to keep a face-down position after surgery, which is uncomfortable and restrictive. For some authors, positioning does not influence the success rate of surgery. We propose to compare the efficiency of macular hole surgery in our patients, depending on post-operative positioning.

**MATERIAL-METHODS:**Comparative retrospective monocentric study of 36 eyes in 36 patients operated for full thickness macular hole surgery according to the International Vitreomacular Traction Group Study. In group 1, 18 eyes of 18 consecutive patients were operated by vitrectomy, internal limiting membrane flap, gas tamponade and with post-operative face-down positioning. In group 2, 18 eyes of 18 consecutive patients were operated by the same technique, without postoperative positioning. The only proscribed position was laying flat on the back.

**RESULTS:**Preoperative mean decimal visual acuity was 0,26 in group 1 and 0,28 in group 2. Average macular hole size was 438µm in group 1 and 402µm in group 2. Primary closure rate at 1 month was 944% in group 1 and 944% in group 2. Mean decimal visual acuity at 6 month was 041 in group 1 and 044 in group 2. For patients with a macular hole larger than 400µm, the closure rate was 100% in group 1 (n=9) and 88,8% in group 2 (n=9).

**CONCLUSIONS:**Postoperative positioning does not seem to influence the rate of closure after macular hole surgery. Subgroup analysis did not find an influence in large macular holes either. Our study adds to existing data and suggests that it is no longer necessary to position the patient face-down in first intention after macular hole surgery.

**Keywords:** macular hole, retinal surgery, face down positioning,



POSTER ABSTRACTS

P-105

Evaluation of silicon oil droplets following intravitreal anti-VEGF injections by B-scan Ultrasonography

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**OBJECTIVE:**To report the incidence and characteristics of silicone oil droplets in the vitreous cavity by B-scan ultrasonography in eyes following intravitreal anti-VEGF injections

**MATERIAL-METHODS:**Observational consecutive study. Patients undergoing intravitreal anti-VEGF injections (Bevacizumab, Ranibizumab or Aflibercept) in either eye, as well as treatment naïve eyes were recruited. All patients prospectively underwent contact B-scan ultrasonography, findings were recorded and graded. 30 decibel reduction test was performed to identify the droplets and differentiate them from other vitreal opacities.

**RESULTS:**Forty eyes of 30 patients were included. Included eyes exhibited at least one echogenic particles in the vitreous cavity consistent with silicone oil droplets following intravitreal anti-VEGF injections. In 25 (64%) eyes, silicon droplets were identified by ultrasonography. Correlation between the echogenic findings to anti-VEGF agent, duration and number of intravitreal injections was assessed. Clinically visible silicon droplets were noted in 5(12%) of patients.

**CONCLUSIONS:**Intravitreal silicone oil droplets are a complication of intravitreal injections and appear very echogenic within the vitreous cavity using ultrasonography. The incidence of these echogenic findings was found to be higher than previously reported. No significant association was identified to a specific anti-VEGF agent

**Keywords:** B-scan ultrasonography, silicon droplets, ant-VEGF injections



POSTER ABSTRACTS

P-106

Multimodal imaging in patients with Cushing's syndrome, searching for pachychoroid

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**OBJECTIVE:** To assess choroidal changes in patients with Cushing's syndrome.

**MATERIAL-METHODS:** A cross-sectional observational study was performed in Ophtalmopôle hôpital Cochin, Paris, France, with a systematic evaluation of hospitalised patients with Cushing's syndrome, between November 2017 and July 2018. All patients had undergone a complete ophthalmic examination with Enhanced-Depth Imaging (EDI)-Optical Coherence Tomography (OCT) and OCT-angiography. Measures of subfoveal, 1000 µm nasal and 1000 µm temporal choroidal thicknesses were realised, presence of choroidal pachyvessels was evaluated. Hormonal tests were also performed for corticotrophic axis. A group of age and gender-matched, and close spherical equivalent healthy participants was also included.

**RESULTS:** Fifty-six eyes from 28 patients were included, with a mean cumulated time of hypercorticism of 5.7 years (6 months to 26 years) and 56 eyes of 28 healthy controls. Twelve eyes of Cushing's syndrome patients (21.4%) had a pachychoroid (subfoveal choroidal thickness > 395 µm). Choroidal pachyvessels were found in 85.7% of eyes (48 eyes) of Cushing's patients. Mean subfoveal choroidal thickness was 331 ± 110 µm. Four eyes of 3 Cushing's syndrome patients had a pachychoroid pigment epitheliopathy and 2 eyes of one Cushing's syndrome patient had a polypoidal choroidal vasculopathy. Frequency of choroidal pachyvessels was statistically higher in patients with Cushing's syndrome than healthy subjects (85.7% vs 44.6%,  $p < 0.01$ ), whereas there was no statistical difference of choroidal thickness between the 2 groups. There was no correlation between choroidal thickness and urinary and salivary cortisol assays.

**CONCLUSIONS:** Patients with Cushing's syndrome have a higher prevalence of choroidal pachyvessels. An ophthalmologic specialised follow-up of these patients with multimodal imaging could detect chorioretinal abnormalities and adapt the surveillance of these patients.

**Keywords:** Cushing, choroid, OCT



POSTER ABSTRACTS

P-107

A case of tuberculosis choroiditis, who was initially treated as multifocal choroiditis.

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**OBJECTIVE:**to report a case of tuberculosis choroiditis, who was initially treated as multifocal choroiditis.

**MATERIAL-METHODS:**a 54 year-old female, diagnosed as multifocal choroiditis, who was receiving systemic prednisone and methotrexate was referred to the clinic. More investigation revealed tuberculosis as the probable cause of choroiditis

**RESULTS:**The four drug antituberculosis regimen started for the patient. Six months later the vision had improved significantly and the uveitis had remitted too

**CONCLUSIONS:**ocular tuberculosis should be considered in the differential diagnosis of many ocular diseases, especially the uveitic syndromes

**Keywords:** ocular tuberculosis, choroidal tuberculosis



POSTER ABSTRACTS

P-108

Visual Loss following Intravitreal Injection of Aflibercept

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<sup>2</sup>*Private Practice, Sousse Tunisia*

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<sup>4</sup>*Private Practice, Djerba Tunisia*

**OBJECTIVE:** To report visual loss following intravitreal injection (IVI) of aflibercept.

**MATERIAL-METHODS:** Retrospective review of 78 patients (108 eyes) who underwent IVI of aflibercept from January 2017 to January 2019.

**RESULTS:** The indications of IVI included diabetic macular edema (72 eyes), choroidal neovascularization secondary to age related macular degeneration (21 eyes), and other conditions (15 eyes). Sudden decrease in visual acuity within the first three days from injection occurred in 11 eyes (10.2%). It was due to noninfectious vitritis in 8 eyes and to infectious endophthalmitis in one eye. In two eyes, the cause of visual loss was unclear. Vitritis was successfully managed with topical steroids in all cases. Visual acuity improved in 9 of 11 eyes. In 2 eyes visual loss was permanent.

**CONCLUSIONS:** Transient or permanent visual loss following IVI of aflibercept, mainly due to noninfectious vitritis, seems to be more frequent than previously reported.

**Keywords:** Aflibercept; visual loss



POSTER ABSTRACTS

P-109

Heidelberg High Magnification objective lens: a higher resolution of the posterior pole

Sergio Piscitello

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**OBJECTIVE:**To analyse the technical characteristics, the acquisition method and the functioning of the new Heidelberg technology: the High Magnification Module. To show images of healthy eyes and compare them with some clinical cases concerning the most common retinal diseases encountered in clinical practice.

**MATERIAL-METHODS:**An observational case series of 10 healthy eyes and 5 eyes affected by retinal pathologies who underwent multimodal imaging with Heidelberg High Magnification Module.

**RESULTS:**10 healthy eyes of 5 patients have been analyzed and their characteristics described. 5 eyes affected by 5 different retinal pathologies (CRSC chronic, Non exudative ARMD, dry eye, macular pucker, atrophic ARMD) have been analyzed and their characteristics described.

**CONCLUSIONS:**Heidelberg High Magnification Module proves to be a new technology available to the retina specialist in the multimodal imaging armament that can provide new and interesting information in the field of retinal posterior pole pathologies able to lay the foundations for further research.

**Keywords:** Heidelberg high magnification module



POSTER ABSTRACTS

P-110

Efficacy and tolerance of Aflibercept intravitreal injection in vitrectomized eyes with diabetic macular edema

Thi Ha Chau Tran<sup>1</sup>, Ali Erginay<sup>2</sup>, Stephanie Baillif<sup>3</sup>, Stephane Verdun<sup>4</sup>, Solange Milazzo<sup>5</sup>, Laurent Kodjikian<sup>6</sup>

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**OBJECTIVE:**The aim of the study is to evaluate the efficacy of intravitreal Aflibercept injection (IAI) for diabetic macular edema in vitrectomized eyes.

**MATERIAL-METHODS:**This is a prospective, multicenter observational study including vitrectomized eyes with persistent diabetic macular edema treated with IAI. The inclusion criteria were diabetic patients whose HbA1c is < 9%, with visual acuity between 20/400 to 20/40, who have underwent vitrectomy since at least 3 months.

**RESULTS:**48 patients from 8 centers were included. Most patients (82%) have type 2 diabetes with at least one extra-ocular diabetes related complication (87%). The average age was 65.9 years. The glycemic control was correct with mean HbA1c of 7.5%. Indications for vitrectomy were epiretinal membrane (61.4%), intravitreal hemorrhage (25%), and vitreomacular traction (6.8%), retinal detachment (4.5%), and other causes (2.3%). Mean duration of macular edema was 3.1 years. Mean interval between vitrectomy and first visit was 21 months. 34/48 were non naïve eyes with previous treatment including thermal laser (31%), intravitreal injection of triamcinolone (18%), of ranibizumab (25%), of dexamethasone implant (25%), or bevacizumab (4%). At baseline, mean visual acuity was 52.3 letters ETDRS and mean central macular thickness was 449µm. Data were available for 31 eyes at 6 months and for 21 eyes at one year. Visual gain was significant, +4.5 letters at 6 months (p=0.004) and + 64 letters at one year (p= 0.002). A significant decrease in central macular thickness and macular volume was observed at 6 months (-67µm, 0.93mm<sup>3</sup>, p= 0.01) and at 1 year (-80µm, 1.15mm<sup>3</sup>, p=0.01). At 1 year, number of Aflibercept injections ranged from 9 to 13 with a mean interval of 6.2 weeks.

**CONCLUSIONS:**These preliminary results suggest that IAI may be beneficial in functional and anatomical outcome. Vitrectomized eyes had characteristic of refractory persistent diabetic macular edema, requiring more injections.

**Keywords:** Aflibercept, diabetic macular edema, vitrectomy, anti-VEGF





POSTER ABSTRACTS

P-111

Misfolded Proteins in the Retina

Umur A Kayabasi

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**OBJECTIVE:**Recent research suggests that Tau is the culprit lesion along with neuroinflammation in the etiology of Alzheimer' s Disease ( AD ). Retina is the extension of the brain and is the most easily approachable part of the central nervous system. Detection of the pathological protein accumulations may be possible by using spectral domain optical coherescent tomography ( SD-OCT ) and fundus autofluorescein ( FAF ). There is evidence showing that retinal plaques start accumulating even earlier than the ones in the brain. Most recent Tau protein images in the brain consist of normal or reverse C-shaped paired hellical filaments.

**MATERIAL-METHODS:**30 patients with PET proven AD were examined by SD-OCT and FAF. Mean age was 72. Hypo or hyperfluorescent retinal lesions on FAF were scanned bySD-OCT and neurofibrillary tangles ( NFT ) and other accumulations were observed in a masked fashion. The researchers agreed on the shape of the lesions. Both C-shaped ( normal or reverse ) NFTs and thinner fibrillary structures were taken into consideration. Also 10 age-matched healthy controls were examined.

**RESULTS:**In all the patients, NFTs that exactly corresponded with the histopathologic and cryo-EM images of Tau in terms of shape and dimension were detected along with thin fibrils and lesions similar to amyloid beta. The number of the retinal filaments and other abnormal proteins was in concordance with the severity of the disease process. The advanced NFT lesions had normal or reverse paired C shapes and thin fibrils had the shape of histopathologic images seen in early developmental stages of the disease. Healthy patients did not have NFTs, but only had rare thin filamentous shapes.

**CONCLUSIONS:**Retinal images of Tau were disclosed for the first time in live AD patients. Retinal neuroimaging is a trustable biomarker and tool for monitoring the disease.

**Keywords:** Tau, OCT, FAF, Imaging



# COMPANY PROFILE



## COMPANY PROFILE

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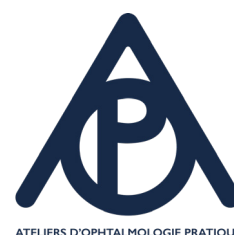
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## COMPANY PROFILE

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## COMPANY PROFILE

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## COMPANY PROFILE

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**Sanotek**  
un regard d'avance sur l'ophtalmologie

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## COMPANY PROFILE

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