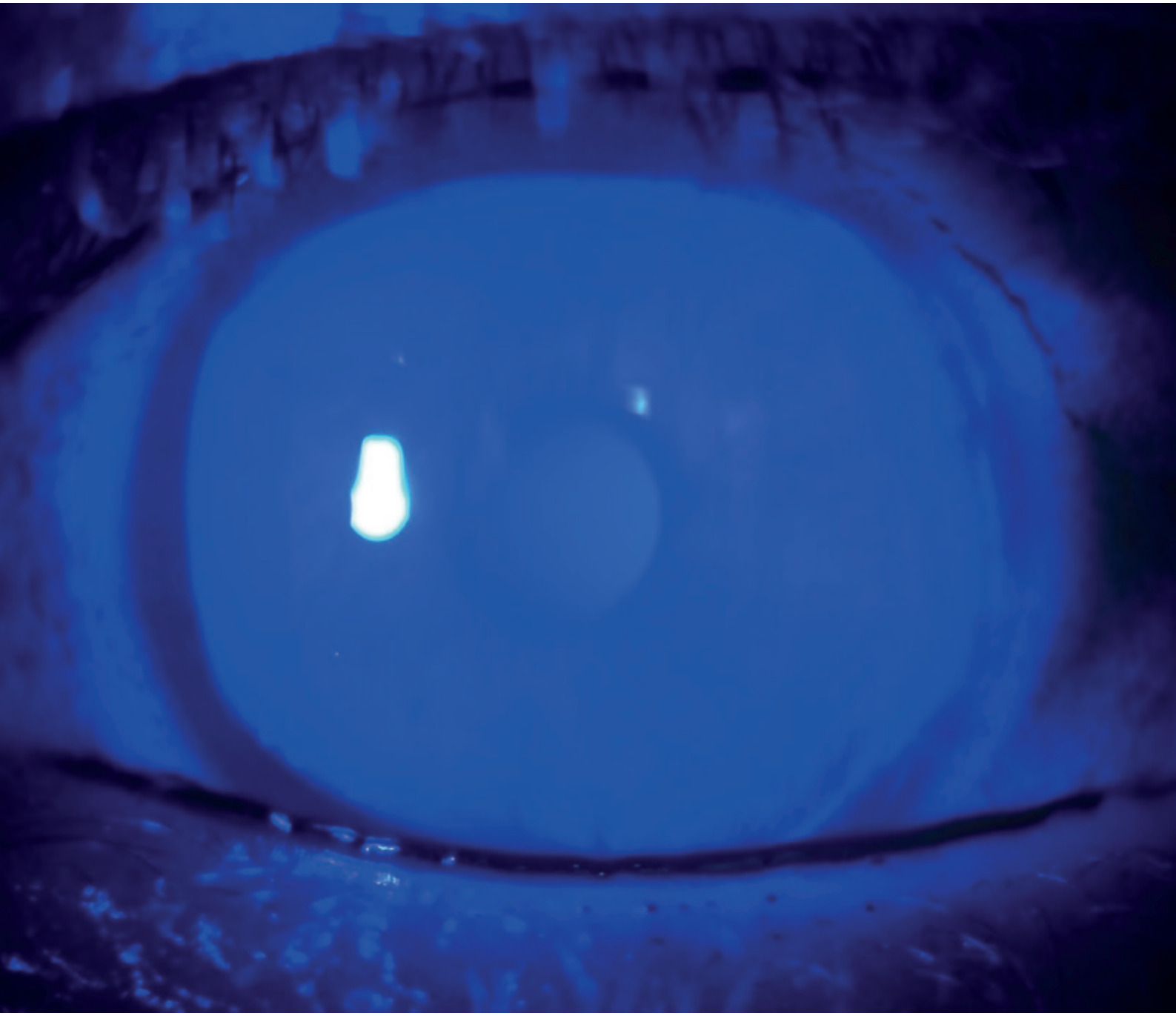
VIENNA INSTITUTE FOR RESEARCH IN OCULAR SURGERY
A KARL LANDSTEINER INSTITUTE

# VIROS
# Annual Report 2021/22



Mein Hanusch-Krankenhaus

www.gesundheitskasse.at

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VIROS

# VIROS
## Annual Report 2021/22

Mein Hanusch-Krankenhaus

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The past years, with the pandemic, posed considerable difficulties not only for each of us individually but also for our work environment. Clinical research was also impacted, as we had to reduce recruitment and follow-up examinations for trial patients, leading to delays in new trials and missing data in ongoing ones. However, over the past 2 years, we have managed to catch up and are almost back to our normal operations.

Thanks to the flexibility and enthusiasm of our team, we utilized our time working from home to write manuscripts for studies already completed a while ago. This resulted in a significant increase in publications by VIROS in 2020 and 2021, one of the few positive aspects of the pandemic. Witnessing the results of our hard work and the dedication of all involved is truly rewarding.

Our commitment to innovation, scientific integrity, and reputation continues to be reaffirmed by our achievements. VIROS stands as one of Austria's leading ophthalmic research facilities, renowned worldwide for its expertise and in-depth studies especially in cataract surgery. However, we must not take this standing for granted, as the institute operates independently of a university setting and requires significant extra effort to secure the necessary financial support for sustainability. It is important to mention that none of the doctors at Hanusch Hospital, who act as clinical investigators, receive payment for their work. Instead, all income goes directly to the institute, and is solely used to fund VIROS staff and equipment.

I extend my gratitude to everyone who has supported the institute, including our industry partners who enable us to engage in trials with prototype diagnostic equipment and novel medicinal products.

Today, with the support of Hanusch Hospital and the Österreichische Gesundheitskasse, industry partners, and our passionate researchers and staff, we continue our journey to further develop our expertise in the field of ophthalmology.

VIROS remains committed to addressing the challenges that ophthalmic surgery still faces, with the goal of delivering enhanced healthcare and improving the well-being of patients undergoing such procedures. At VIROS, our patients are at the heart of everything we do.

Enjoy our report!

Univ. Prof. Dr. Oliver Findl
Founder and Director of VIROS



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VIROS

## VIROS

The Vienna Institute for Research in Ocular Surgery (VIROS) is a highly motivated group of researchers that work in the fields of cataract surgery and its related topics, as well as myopia, medical and surgical retina, glaucoma, strabismus and corneal surgery. The institute was founded in 2010 by Oliver Findl as a Karl Landsteiner institute and has become the largest of all the 70 institutes in Austria. It is integrated into the Department of Ophthalmology at Hanusch Hospital in Vienna. Clinical studies are the main focus of research as well as some basic science and translational research projects. Most studies are investigator-initiated trials, some supported by medicinal product and pharmaceutical companies, others through public funding sources.

KARL LANDSTEINER GESELLSCHAFT

## THE KARL LANDSTEINER SOCIETY

The society, which takes its name from the Lower Austrian Nobel Prize winner and discoverer of blood groups, is committed to supporting medical research at the highest level. It is an independent medical-scientific research institution, organised as a charitable association with independent institutes.

The Karl Landsteiner Society currently comprising 70 institutes covering almost all fields of medicine. The Institutes under the directorship of renowned personalities focus their activities on patient care, conduct their research work alongside their regular hospital work, thus ensuring direct practical relevance. Concrete aims and ongoing assessments ensure constantly high quality standards in all research projects.

## OBJECTIVES

- Research
  Creative, independent, quality-assured
- Progress
  Patient-focused, networked, practice-related
- Support
  Innovative, transparent, successful

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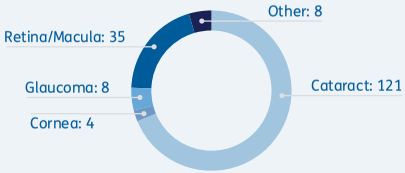
# Trials 2022

**50** Ongoing

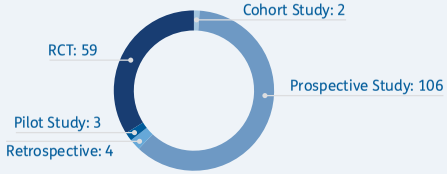
**756** Number of patients in ongoing trials in 2022

## Trials 2010–2022

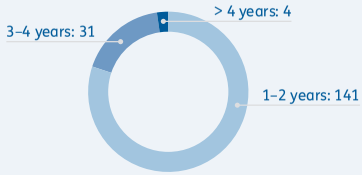
### TOPIC



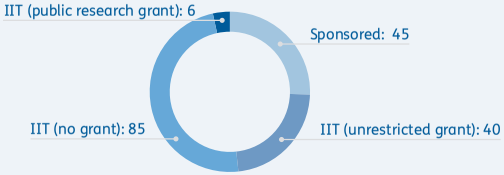

### DESIGN



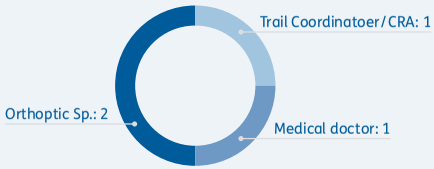

### DURATION




### FUNDING



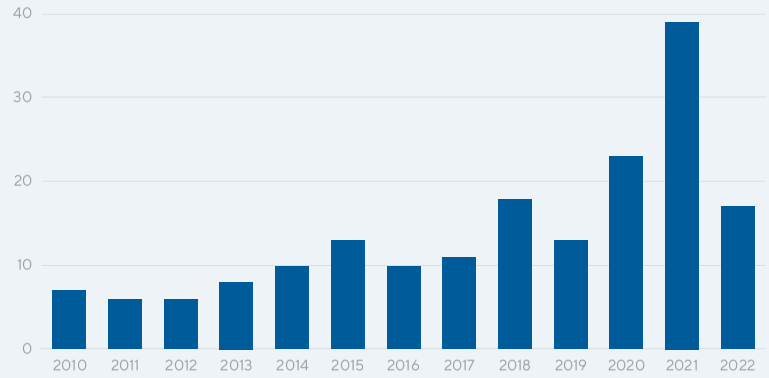

### STAFF




**17** Peer-reviewed publications 2022

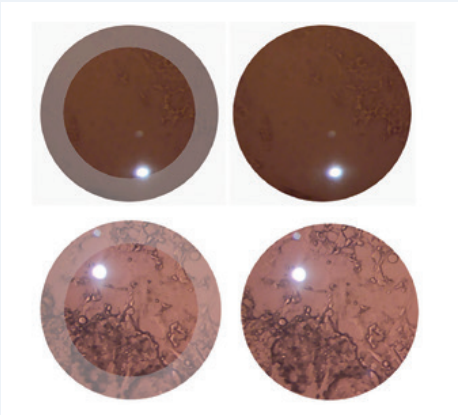
**68,5** Impact factor 2022
Increase to 2020: +67%

VIROS Publications 2010–2022




## CODE - FREE DEEP LEARNING FOR DETECTION AND EVALUATION OF POSTERIOR CAPSULE OPACIFICATION

Deep learning (DL) has been proven to be a powerful tool for image analysis and has been applied to cataract-related image classification. Posterior capsule opacification (PCO) can be detected in retroillumination images and is the most common long-term complication of cataract surgery.
Code-free DL can be used to train DL systems to detect clinically significant PCO. Clinicians can use code-free DL with little coding experience to develop clinically relevant artificial intelligence applications. This novel use case of code-free DL explores new areas of clinical relevance outside of the classic domains of DL in ophthalmology and serves as a proof of concept to help bridge the gap between research and potential clinical applications.
For this retrospective registry study, three expert observers graded two independent datasets of 279 images three separate times with no PCO to severe PCO, providing binary labels for clinical significance. The code-free deep learning system (CFDLS) was trained and internally validated using 179 images of a training dataset and externally validated with 100 images. This CFDLS provides highly accurate discrimination between clinically significant and nonsignificant PCO equivalent to human expert graders.



Examples of non-significant (above) and significant (below) posterior capsule opacification

## VISUAL PERFORMANCE OF TWO DIFFRACTIVE TRIFOCAL INTRAOCULAR LENSES: A RANDOMIZED TRIAL

The purpose of this study was to compare two trifocal intraocular lenses (IOLs), the RayOne Trifocal RA-O603F IOL (closed-loop haptic IOL; Rayner Intraocular Lenses Limited) and the AT Lisa tri 839 MP IOL (plate-haptic IOL; Carl Zeiss Meditec AG), concerning optical and capsular bag performance.

Patients scheduled for cataract surgery received either a closed-loop haptic IOL or a plate-haptic IOL in the first eye and the other IOL in the second eye. Follow up was scheduled three months postoperatively.

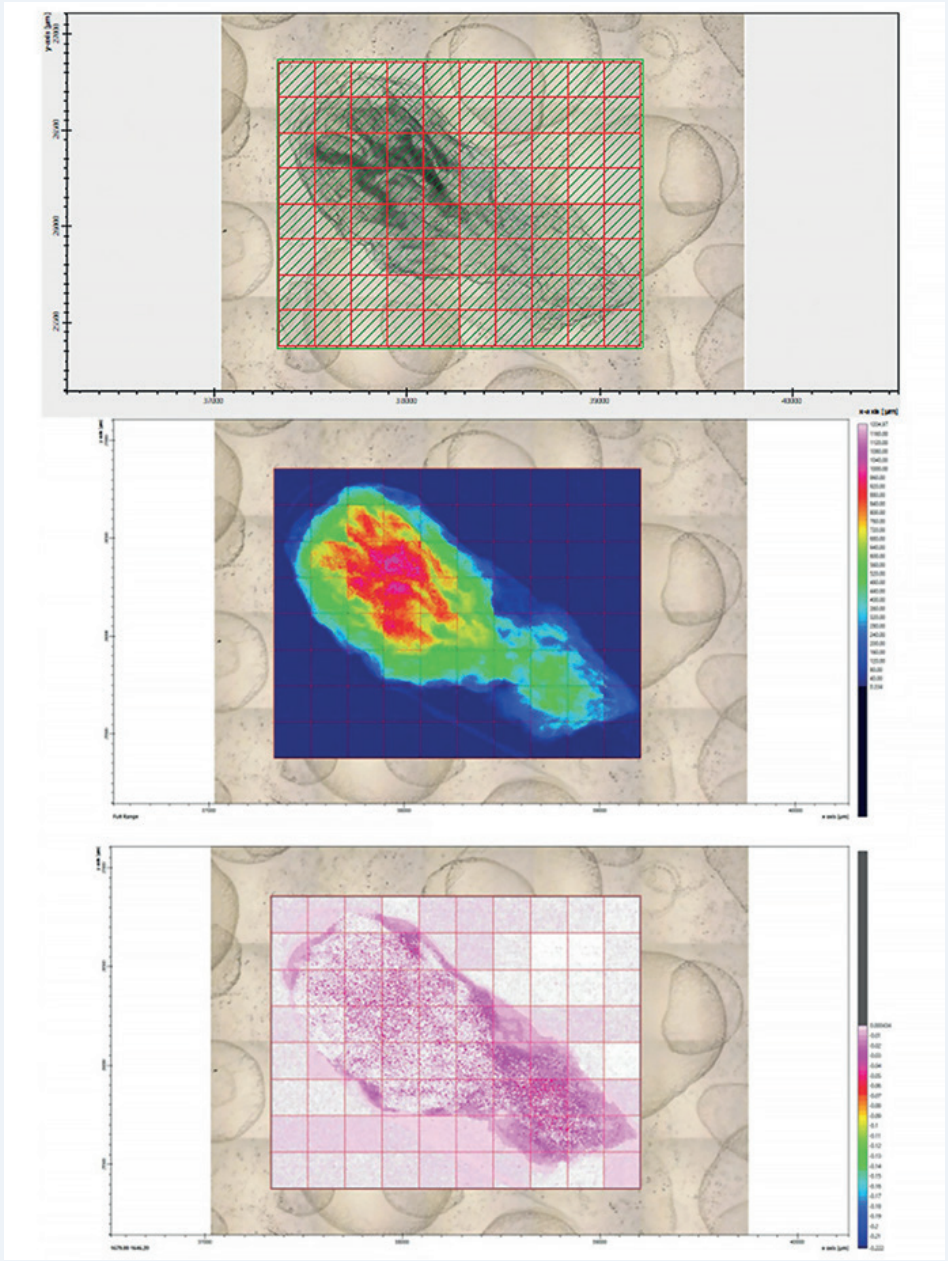
Both trifocal IOLs delivered good and comparable visual function with low degrees of disturbing dysphotopsia. The closed-loop haptic IOL was slightly superior in the defocus curve measurements, whereas the plate-haptic IOL was slightly superior concerning contrast sensitivity and positive dysphotopsia, which was assessed with more accuracy in this bilateral study design setup

## FOURIER-TRANSFORM INFRARED SPECTROSCOPY OF EPIRETINAL MEMBRANES AND INTERNAL LIMITING MEMBRANES AFTER PARS PLANA VITRECTOMY WITH MEMBRANE PEELING

Fourier-transform infrared imaging (FTIRI) enables examination of protein secondary structure in the analyzed tissues. The aim of this study was to examine the distribution of secondary structures in epiretinal membranes (ERMs) and internal limiting membranes (ILMs), and to explore possible associations to other diagnostic variables.

This prospective pilot study included patients scheduled for pars plana vitrectomy with membrane peeling. ERMs and ILMs were harvested during surgery and placed on a BaF2 window for postsurgical FTIRI analysis. Samples of 43 patients were analyzed, with the triple helical domain showing the highest prevalence in the examined tissues. FTIRI enables analysis of the spatial distribution of protein secondary structures in the examined tissues; thus, appears to be a useful analytical technique for the analysis of ERMs and ILMs.





FTIRI analysis of an ERM sample of a patient with an idiopathic ERM: native tissue sample (upper panel), organic matrix distribution based on FTIRI (middle panel), and second derivative analysis with peaks at wavenumber 1661, indicative for triple helix domain (lower panel)

# Partners

## INDUSTRY PARTNERS / SPONSORS

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## ACADEMIC PARTNERS

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Maastricht University
Medizinische Universität Graz
MEDIZINISCHE UNIVERSITÄT WIEN
Moorfields Eye Hospital NHS NHS Foundation Trust
UMC Utrecht
Universiteit Antwerpen
UKS
Vardinoyannion Eye Institute of Crete

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COOKE DL, RIAZ KM, MURPHY DA, FINDL O, LANGENBUCHER A, GU D, BASTI S, CANNON N, PANTANELLI SM, BOLZ M, WENDELSTEIN
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2) An evaluation of the efficacy of a supplemental computer-based tutorial to enhance the informed consent process for cataract surgery: an exploratory randomized clinical study.
ULLRICH M, FINDL O, KEFER K, DÖLLER B, VARSITS R, HIENERT J, HIRNSCHALL N.
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3) Influence of combined phacovitrectomy without tamponade on intraocular lens displacement and postoperative refraction
MAYER-XANTHAKI C F, HIRNSCHALL N, GABRIEL M, GROSSPÖTZL M, WALLISCH F, FINDL O, HAAS A
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4) Diagnostic accuracy of code-free deep learning for detection and evaluation of posterior capsule opacification.
HUEMER J, KRONSCHLÄGER M, RUISS M, SIM D, KEANE PA, FINDL O, WAGNER SK.
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*J Cataract Refract Surg. 2022 Nov 1;48(11):1342-1345*

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HIENERT J, AMIR ASGARI S, MATZ H, HIRNSCHALL N, FINDL O
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8) Influence of combined phacovitrectomy without tamponade on intraocular lens displacement and postoperative refraction.
MAYER-XANTHAKI CF, HIRNSCHALL N, GABRIEL M, GROSSPÖTZL M, WALLISCH F, FINDL O, HAAS A.
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11) Traumatic cataract in a young patient with myopia
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MELANIE WÜST, PHILIPP MATTEN, MAGDALENA NENNING, OLIVER FINDL
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18) Evaluation of the survey of the Austrian Ophthalmic Society, Commission for Cataract Surgery and Intraocular Implants for 2020).
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LEISSER C, HUEMER JC, FINDL O.
*Case Rep Ophthalmol. 2021 Apr 6; 12(1): 105-109.*

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50) Repeatability oft wo swept-source optical coherence tomography biometers and one optical low coherence reflectometry biometer.
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51) Precision and refractive predictability of a new nomogram for femtosecond laser-assisted corneal arcuate incisions.
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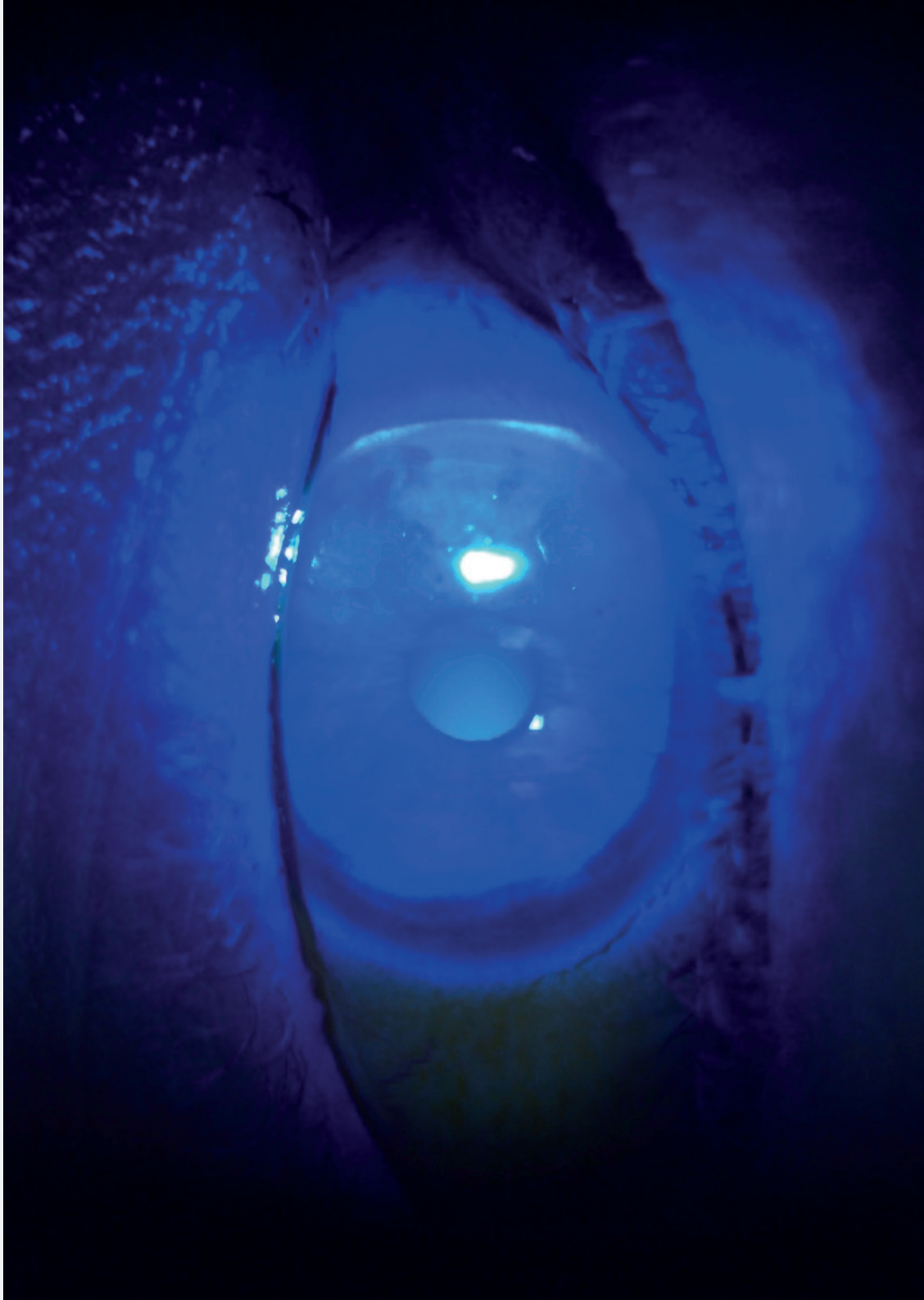
## BACHELOR THESIS 2021 - 2022

EMILY FIDDAMAN, BA1
Vertikales Retraktionssyndrom mit Strabismus divergens

EMILY FIDDAMAN, BA2
Definition und Nomenklatur der Pseudomyopie und deren klinische Relevanz für den*die Orthoptisten*in

ANDREINA PONTONI, BA2
Die Rolle des*der Orthoptisten*in in Subsahara-Afrika

DARIA AMON
Quantification of Metamorphpsia using a Smartphone-based Hyperacuity Test and Associations between OCT Biomarkers and Postoperative Visual Outcomes in Patients with Idiopathic Epiretinal Membranes



## CONFERENCE TALKS (WITHOUT O. FINDL)

### 2021

1) „Variabilität der Vorderkammertiefe zwischen zwei hydrophoben einteiligen Intraokularlinsen aus Acryl: eine randomisierte Studie“ RUISS M ET AL., ÖOG (Alpbach)

2) „Prävention von Apoptose durch ultraviolette Strahlung in Linsenepithelzellen nach peroraler Koffeineinnahme“, RUISS M ET AL., ÖOG (Alpbach)

3) “Patient*innenaufklärng einmal anders“ RUISS M ET AL., ÖOG (Alpbach)

4) “Comparison of corneal aberrations with swept-source anterior segment OCT and Placido disk-combined anterior segment OCT in regular eyes.” GEORGIEV S ET AL., ESCRS (Amsterdam)

5) “Digital swept source optical coherence aberrometry.” GEORGIEV S ET AL., YSA PhD Symposium (Vienna)

6) “Repeatability and reproducibility of post-operative refraction in patients with Eyhance monofocal intraocular lens” FISUS ET AL., ESCRS (Amsterdam)

7) “Assessment of intraoperative capsular polishing on the development of posterior capsule opacification”, FISUS ET AL., ESCRS (Amsterdam)

8) „Effekt von oral verabreichtem Dronabinol auf die Durchblutung des Sehnervenkopfes - eine randomisierte klinische Studie”, HOMMER ET AL., ÖOG (Alpbach)

9) „Stability of biometry in patients with meibomian gland dysfunction”, SCHLATTER ET AL., ESCRS (Amsterdam)

10) “Reliability of OCT Biomarkers for Idiopathic Epiretinal Membranes”, LEISSER ET AL, EURETINA (Virtual Meeting)

### 2022

1) ePoster „Comparison of methods to experimentally induce opacification and elasticity change in ex-vivo porcine lenses“ RUISS M ET AL., ESCRS Portugal

2) „Aus alt mach neu - Upcycling der Augenlinse“ RUISS M, Orthoptik Austria Online (OAO)

3) „Vergleich unterschiedlicher Methoden zur Induktion von Trübungen und Elastizitätsänderungen in ex-vivo Linsen aus Schweineaugen“ RUISS M ET AL., ÖOG (Villach)

4) „Comparison of two optical coherence tomography devices in corneal epithelial thickness maps“, FISUS ET AL., ESCRS

5) „Vergleich von Hornhautepitheldickenkarten mit zwei optischen Kohärenztomographiegeräten“, FISUS ETAL., ÖOG (Villach)

6) “Comparison of three swept-source optical coherence biometry devices in long and short eyes”, FISUS ET AL., ESCRS (Mailand)

7) „Vergleich von drei swept-source optischen Kohärenzbiometriegeräten in langen und kurzen Augen“, FISUS ET AL., DOC

8) „Diagnostik und Biometrie basierend auf ss-OCTTechnologie: Biometrie basierend auf ss-OCT-Technologie“, FISUS ET AL., Spektrum 2022 Workshop

9) „Intrascleral IOL Fixiation“, KRONSCHLÄGER ET AL., ESCRS (Mailand)

10) „Retinaler Sauerstoffmetabolismus bei Patienten mit Typ-2-Diabetes und verschiedenen Stadien diabetischer Retinopathie“, HOMMER ET AL., ÖOG (Villach)

11) “Effect Of Toric Intraocular Lenses In Eyes With Low Astigmatism”, HIENERT ET AL., ESCRS (Mailand)

12) “Role Of Postoperative Lubrication In Preventing Dry Eye After Cataract Surgery”, PALKOVITS ET AL., ESCRS (Mailand)

13) “Development Of Posterior Vitreous Detachment After Lens Surgery In Myopic Eyes – 1-Year Results Of The Escrs Myopred Study”, ULLRICH ET AL., ESCRS (Mailand)

14) “Foveal Sparing ILM Peeling with ILM Flap Transposition for Macular Hole Repair”, LEISSER ET AL, EURETINA (Hamburg)

15) “Rotational Stability Of A Toric Monofocal Intraocular Lens With An Extended Depth Of Focus”, ZEILINGER ET AL., ESCRS (Mailand)

16) “Rotationsstabilität einer torischen monofokalen Intraokularlinse mit erweiterter Tiefenschärfe“, ZEILINGER ET AL. ÖOG (Villach)

17) “High Tech in the operating room - Digital marking”, ZEILINGER ET AL. ESONT (Mailand)



# Impressum

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