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RESEARCH AREA

The presentation of this research area focuses on the field of neuro-ophthalmology, which investigates the relationship between the nervous system and eye diseases. Research in this area pays particular attention to microcirculatory and neurodegenerative changes that occur in different structures of the eye, such as the optic nerve, the cornea and the capillaries of the retina. Modern imaging techniques, such as optical coherence tomography (OCT) and confocal microscopy, allow detailed mapping of these subtle structural changes, which can provide important information not only about ophthalmological but also about general neurological conditions.

The aim of this study is to investigate the structure of the cornea and retina, as well as the optic nerve head in patients with neurological diseases, and to find correlations with systemic neurological pathologies. In addition, the aim is to develop a new imaging analysis method to quantify early neurodegenerative and neuroregenerative changes, particularly in the corneal nerve fiber plexus and retinal capillaries.

TECHNIQUES AVAILABLE IN THE LAB

There are a number of important techniques that can be learned in the course of research. These include the use of optical coherence tomography (OCT) and in vivo confocal microscopy to obtain detailed images of the structure of the cornea and optic nerve. In addition to using these techniques, quantitative analysis can be learned, such as measuring the morphology of corneal nerve fibres and examining the capillary plexus of the retina. Research will emphasise statistical analysis, interpretation of results, and the ability to place them in a scientific context, publish and improve presentation skills.

SELECTED PUBLICATIONS

Patzkó, Á., Pfund, Z., Csutak, A., Tóth, N., Kölkedi, Zs., Kis-Jakab, G., Bosnyák, E., Rozgonyi, R., **Szalai, E.** (2024) Neurovascular changes of the retina and optic nerve head in episodic migraine. **Sci Rep 14:** 20243.

Patzkó, Á., Csutak, A., Tóth, N., Kölkedi, Zs., Pfund, Z., Kis-Jakab, G., Bosnyák, E., Rozgonyi, R., **Szalai, E.** (2024) Analysis of the ocular surface functional unit in episodic migraine. **Graefes Arch Clin Exp Ophthalmol 262:** 1591-1598.

Kölkedi, Zs., Csutak, A., **Szalai, E.** (2022) Corneal Cellular and Neuroinflammatory Changes After SARS-CoV-2 Infection. **Cornea 41:** 879-885.

Kolkedi, Zs., Csutak, A., **Szalai, E.** (2023) Pre-Ophthalmoscopic Quantitative Biomarkers in Diabetes Mellitus. **Transl Vis Sci Technol 12:** 24.