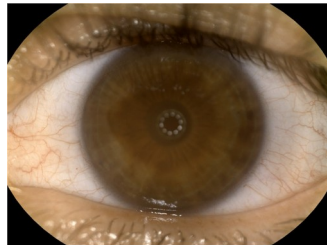


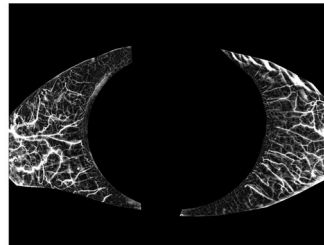
# Analysis of the ocular surface vascular system based on external eye color photography

## Presentation of the problem/motivation

The ocular surface vascular system plays a key role in corneal and conjunctival inflammatory, infectious and neoplastic pathology<sup>1</sup>. Current imaging technology for ocular surface angiography are fluorescein angiography (FA), indocyanine green angiography (ICGA), both imaged using slit-lamp camera modules, and optical coherence tomography (OCT) angiography (OCTA). Latter has the big advantage of assessing the vasculature in three dimensions without the need of a contrast agent. While OCTA was recently successfully introduced for imaging the vasculature in the posterior eye, the application for assessing the anterior segment, especially the ocular surface, is still ongoing and currently has its limitation in imaging time and field-of-view. A novel photography system dedicated for standardized imaging the whole visible ocular surface was recently introduced by OCCYO GmbH. In this work we want to investigate the capabilities of the novel device to assess the ocular surface vascular system.



Standardized external eye photography



Extraction of the ocular surface vascular system

## Aim and leading question

In this work the capabilities of the novel image system to extract the ocular surface vascular system shall be investigated based on existing image data. The aims are defined as the following:

1. Extraction of the vascular system based on color photography
2. Investigate and define angiographic parameters to perform quantitative vessel analysis
3. Validate the approach on image data of healthy subjects and clinical data

## Method and planned strategy

Existing image data from a healthy eye study and clinical study will be used throughout this work. (1) To extract the vascular system from the images different color channels and combination should be evaluated to improve the initial extraction. Subsequently image filtering techniques should be evaluated to further enhance the vascular structures. (2) Various angiographic parameters shall be investigated and vessel analysis should be performed on the enhanced images. In addition, segmentation of the blood vessels might be applied and investigated how additional segmentation would impact the quantification of vessel parameters. (3) The approach should be validated with additional data and correlated to clinical parameters such as the eye redness and pathologies.

## References

<sup>1</sup> Steger, B. (2021). Ocular surface angiography: from neovessels to neoplasia. *BMJ Open Ophthalmology*, 6(1).