Whenever you go to the doctor to get your eyes checked, chances are that your eyes will be screened with a Scheimpflug-based camera. This is the widest spread technology to assess the shape of the outer transparent lens of your eye, the cornea.

The cornea is crucial for vision process and it is a target tissue to disease diagnosis. One of the most common diseases that affects the cornea is called keratoconus. People that suffer from keratoconus get their corneas progressively deformed, which seriously compromises their vision. The early detection of this serious ophthalmic disease is still a clinical challenge. In the clinical setting, the ophthalmologist usually sets if a cornea is healthy or not based mostly on its shape, these are macroscopic parameters. **M^{A}_{I}CRO** (*Macro- and microscopic Corneal ectasia Research for Ophthalmology supported by Artificial Intelligence*) aims to investigate the corneal microstructure using unorthodox image-based methods and to combine it with well-known measures of corneal macrostructure. This approach, which has not been used so far, will help to deepen knowledge about corneal diseases and for subsequent early keratoconus detection and severity grading. In other words, we want to use traditional macroparameters, like corneal shape, in combination with custom-made biomarkers related to corneal microstructure to better understand the disease in its early stage. To do so, we will use Scheimpflug images of hundreds of healthy and keratoconus eyes that are already available in the database of medical collaborators. These images are already collected and will be shared with us by our medical collaborators. In the purely experimental part of the project we will use porcine (pig) eyes with altered biomechanical properties that will be imaged with high-tech high-resolution microscopes to learn about actual changes in corneal tissue in detail.

The impact of **M^{A}_{I}CRO** will be a better understanding on how custom-made biomarkers related to corneal microstructure relate to actual changes in corneal tissue, as well as, an advancement of early kerataconus detection.