

We are currently seeking a highly motivated life science student (f/m/d) for a master thesis on

## “Mechanical homeostasis of retinal pigment epithelium in ageing”

Age-related macular degeneration is the most impactful blinding disease of the elderly population. The most vulnerable outer retinal layer involved in AMD pathogenesis is the retinal pigment epithelium (RPE). RPE cells experience severe remodelling during the disease - alterations of their extracellular matrix, cellular hypertrophy, increased size heterogeneity and severe cytoskeletal remodelling. These alterations strongly suggest changes in epithelial mechanics. With age being the major risk factor for AMD, it is crucial to understand how the healthy RPE ages in terms of mechanics to identify when a phenotypic switch may lead to AMD.

The RPE is a post-mitotic epithelium, meaning cells cannot proliferate in response to apoptosis. Cellular hypertrophy and reconfiguration compensate for the linear reduction of RPE cell numbers with age. The induction of apoptosis *in vitro* can mimic RPE ageing and provide the opportunity to ‘mechanically age’ the epithelial monolayer similarly to material ageing. It is unknown if this age-related density reduction affects monolayer mechanics of the RPE and what implications the effects have on RPE function.

### Project aim:

The project aims to characterise epithelial mechanics of an ageing post-mitotic epithelium. Ageing of hiPSCs-derived RPE cells will be mimicked by inducing large-scale density reduction. At the same time, mechanics will be analysed in terms of traction forces, stresses within the monolayer, cell stiffness and monolayer arrangement.

### We offer:

- Interdisciplinary and active research environment
- Close practical and theoretical supervision
- Possibility for ending up in publication

### Your tasks:

- Culture of hiPSCs-derived RPE on polyacrylamide hydrogels and ageing-mimicking stimulation
- Traction force and monolayer stress microscopy of ‘aged’ vs control cells
- Segmentation and image analysis
- Optional: Nanoindentation, immunofluorescent staining

### Your profile:

- Master student in Biology, Biotechnology, Biomedical engineering, or a related discipline
- Motivated, focused and team-oriented attitude
- Experience with cell culture, microscopy, AFM, Fiji or Matlab are a plus

If you are interested, please send a short motivational letter, CV and transcripts at [jdirusso@ukaachen.de](mailto:jdirusso@ukaachen.de)

