The mechanical properties of neuronal tissue determine their function and the interaction of cells. Even adult tissue such as the human retina is still under mechanical tension, which can cause severe problems during surgery. Moreover, changes in cell and tissue elasticity during eye diseases, such as macular degeneration, can result in tissue rupture and blindness. The research group aims at a better understanding of the global mechanical properties of retinal tissue and how local heterogeneities might influence the entire tissue elasticity. To this end, the research group employs nanotube array substrates, whose interaction properties with individual cells and the overall tissue can be tuned by the tube parameters.

The group showed for the first time that adult retinal tissue can be successfully cultured longer than 14 days with no indications of degeneration. These substrates are used to strain retinal tissues and investigate their mechanical response to external stresses. Together with the application of different drugs, the research will pave the way for new therapeutic approaches of eye diseases from a materials science perspective.