

## KEYWORDS

- » Retina Biomechanics
- » Retina Optics
- » Retina Degeneration/Regeneration
- » Retina Surgery (Basics)



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## BIOPHYSICS OF RETINAL CELLS – BASICS OF RETINA SURGERY

Retina surgery (including implantation of prostheses) is a rapidly developing field but most of the progress is based upon empirics. The group's studies focus upon the evaluation of basic biomechanical and optical properties of retinal cells, in order to provide novel ideas and approaches for retina surgery.

In one line of experiments, they are studying light propagation in retinal whole-mounts, and light guiding properties of individual retinal cells. With that they are able to show that the inner retina resembles an optic fiber plate, transferring the image towards the photoreceptor cells; in contrast to an artificial optic fiber plate, however, the light-conducting elements of the retina leave space for many information-processing elements. Similar principles may be applied to retina implants.

In another line of experiments, the group is investigating the mechanical properties of distinct types of neurons and glial cells acutely isolated from brain and retinal tissue. They are using an optical stretcher, a dual beam laser trap, as well as Scanning Force Microscopy. As a result they were able to show that glial cells are softer than neurons, and may thus provide a 'protective envelope' of the neurons in cases of mechanical stress. The group will extend these studies to improve current methods of retina surgery.

## SELECTED REFERENCES

FRANZE, K.; GROSCHE, J.; SKATCHKOV, S. N.; SCHINKINGER, S.; FOJA, C.; SCHILD, D.; UCKERMANN, O.; TRAVIS, K.; REICHENBACH, A.; GUCK, J.

Müller cells are living optical fibers in the vertebrate retina. PNAS 104 (2007), 8287–8292.

LU, Y.; FRANZE, K.; SEIFERT, G.; STEINHÄUSER, C.; KIRCHHOFF, F.; WOLBURG, H.; GUCK, J.; JANMEY, P.; KÄS, J.; REICHENBACH, A. Viscoelastic properties of individual glial cells and neurons in the CNS. PNAS 103 (2006), 17759–7764.

WOLF, S.; SCHNURBUSCH, U.; WOLBURG, H.; WIEDEMANN, P.; GROSCHE, J.; REICHENBACH, A.

Peeling of the Basal Membrane in the Human Retina: Ultrastructural Effects. Ophthalmology 111 (2004), 248–253.