

Brillouin microscopy - a tool to detect weak corneas

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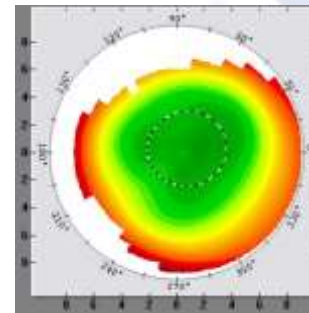
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Case WW

The 50 years old patient had 15 years ago LASIK (microkeratome) and experienced some regression which is disturbing during night driving.

VA OD -1.5sph = 1.0 OS (dominant) -1.75sph = 1.1



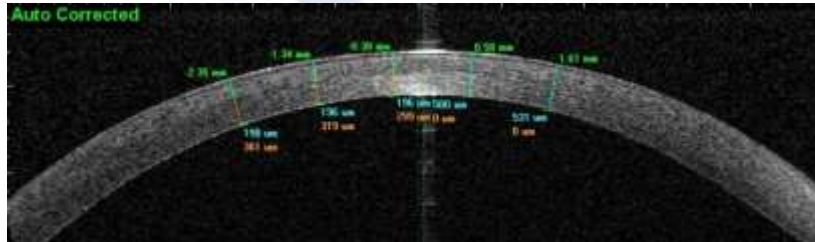
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Case WW

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CCT 500 µm flap thickness 200 µm

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Case WW

The current residual thickness is 300 microns.

Can we risk to remove another 30 microns or shall we do a PRK?

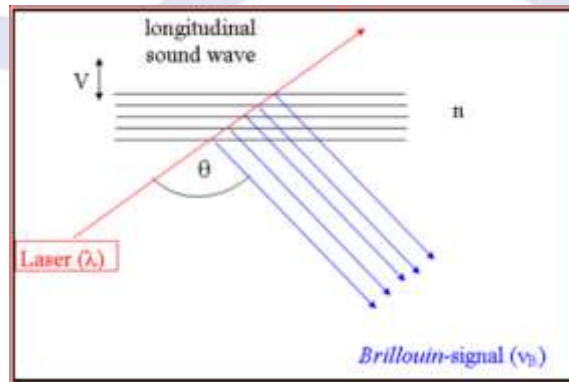
The critical question is:

- Is it a stiff corneawe can do a **relift**
- Is it a weak corneawe have to do a **PRK**

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Brillouin effect

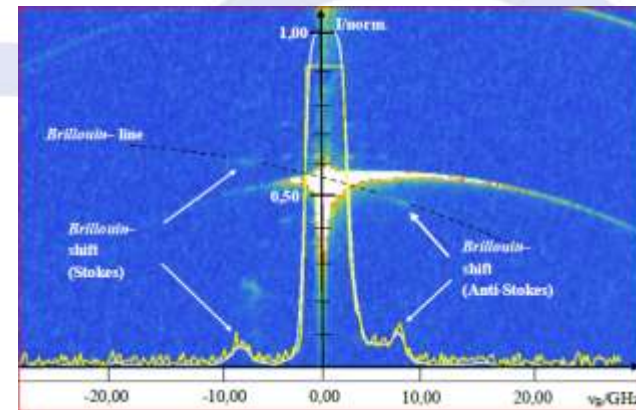


$$v_p = \frac{\omega_p}{k_p} = \frac{\omega_s \pm \omega_l}{k_p} = \Delta\nu_B \frac{\lambda}{2n \sin(\theta/2)}$$

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Brillouin effect

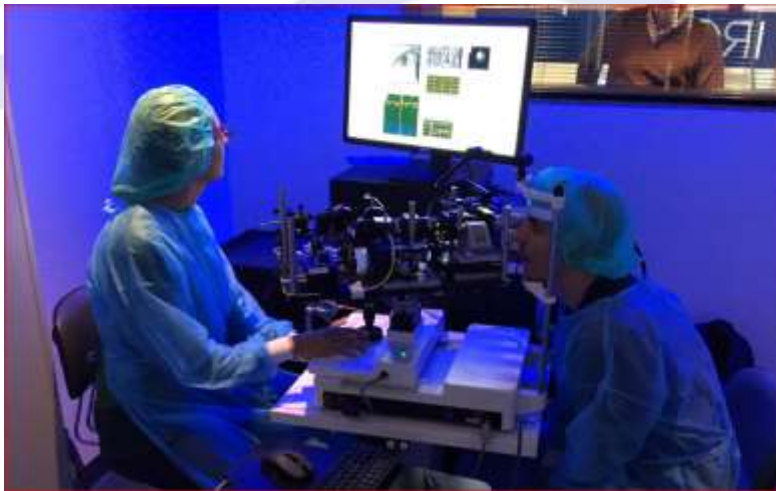


$$v_p = \sqrt{M/\rho} \quad (\rho \text{ is the density of the medium})$$

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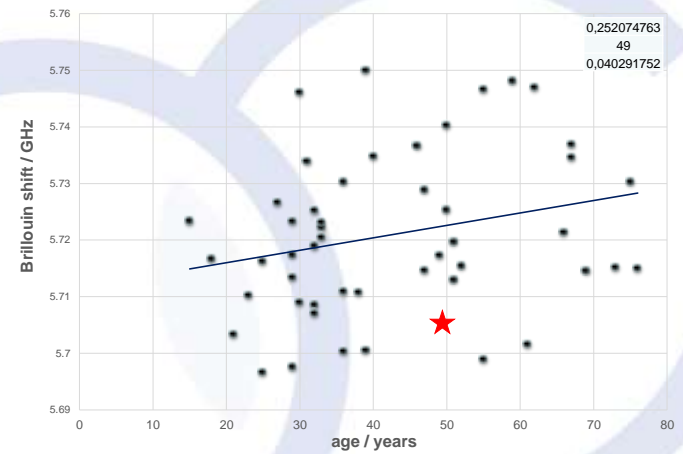
Brillouin optical scanner



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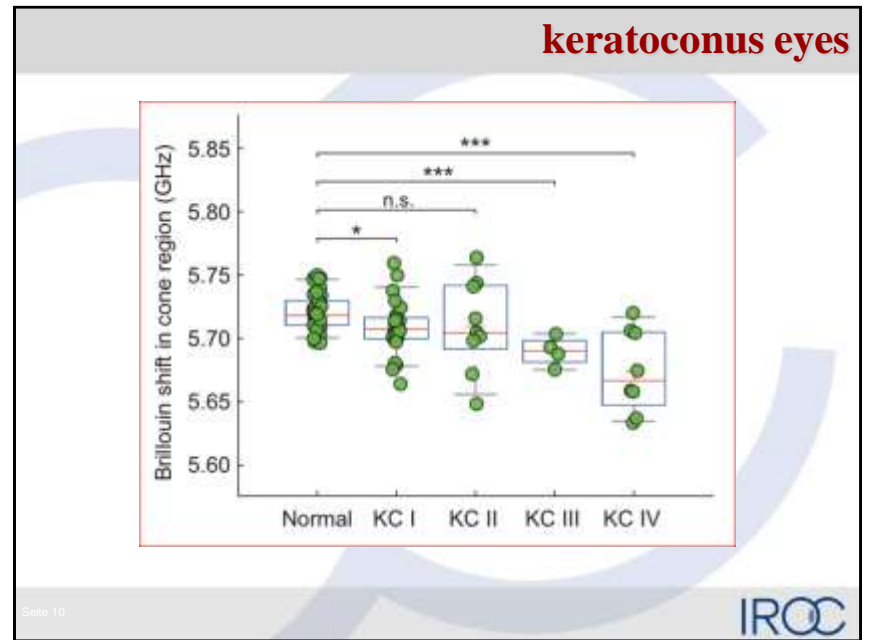
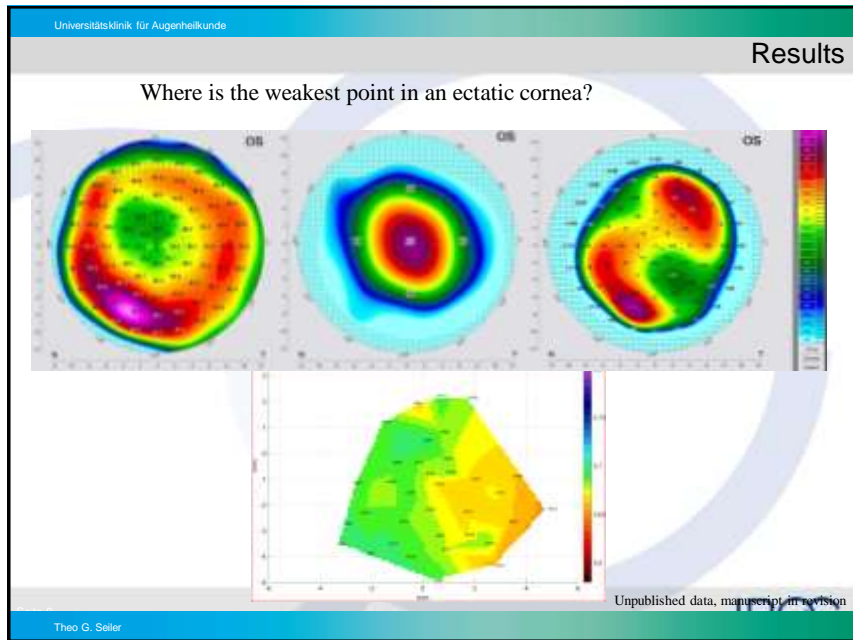
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normal eyes

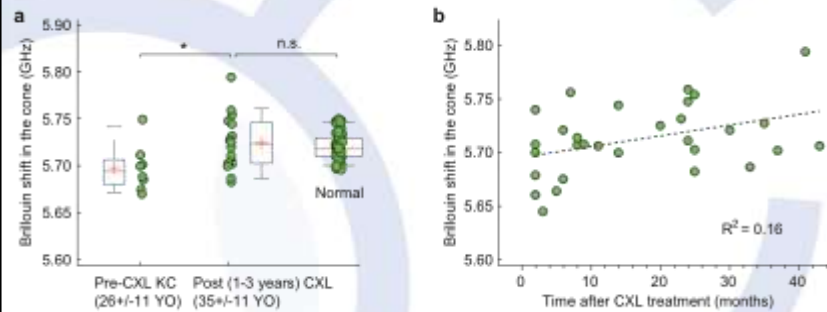


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CXL effect



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Conclusions

1. The Brillouin effect allows to measure an elastic modulus of the cornea non-invasively
2. This knowledge is helpful for some clinical decisions
3. The measured bulk modulus correlates with age
4. The CXL-effect is detected for the first time
5. The CXL-effect increases with time

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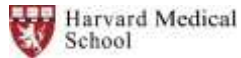
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Thank you for your attention!

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