

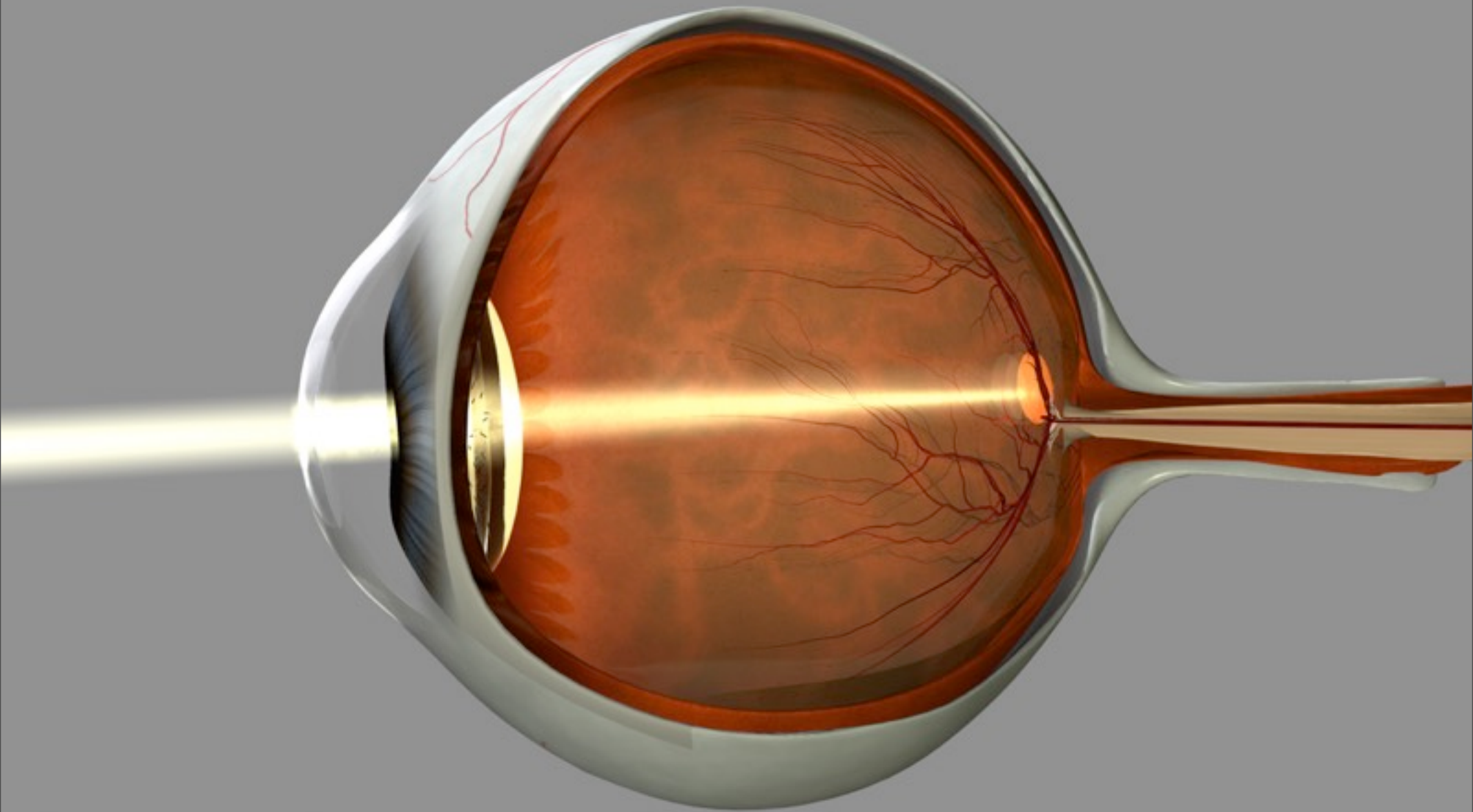
RETINA

CURRENT CONQUESTS AND FUTURE CHALLENGES



FREDRIK GHOSH, LUND UNIVERSITY

VISION?



RETINAL RESEARCH FROM MOLECULE TO MAN

WHO?



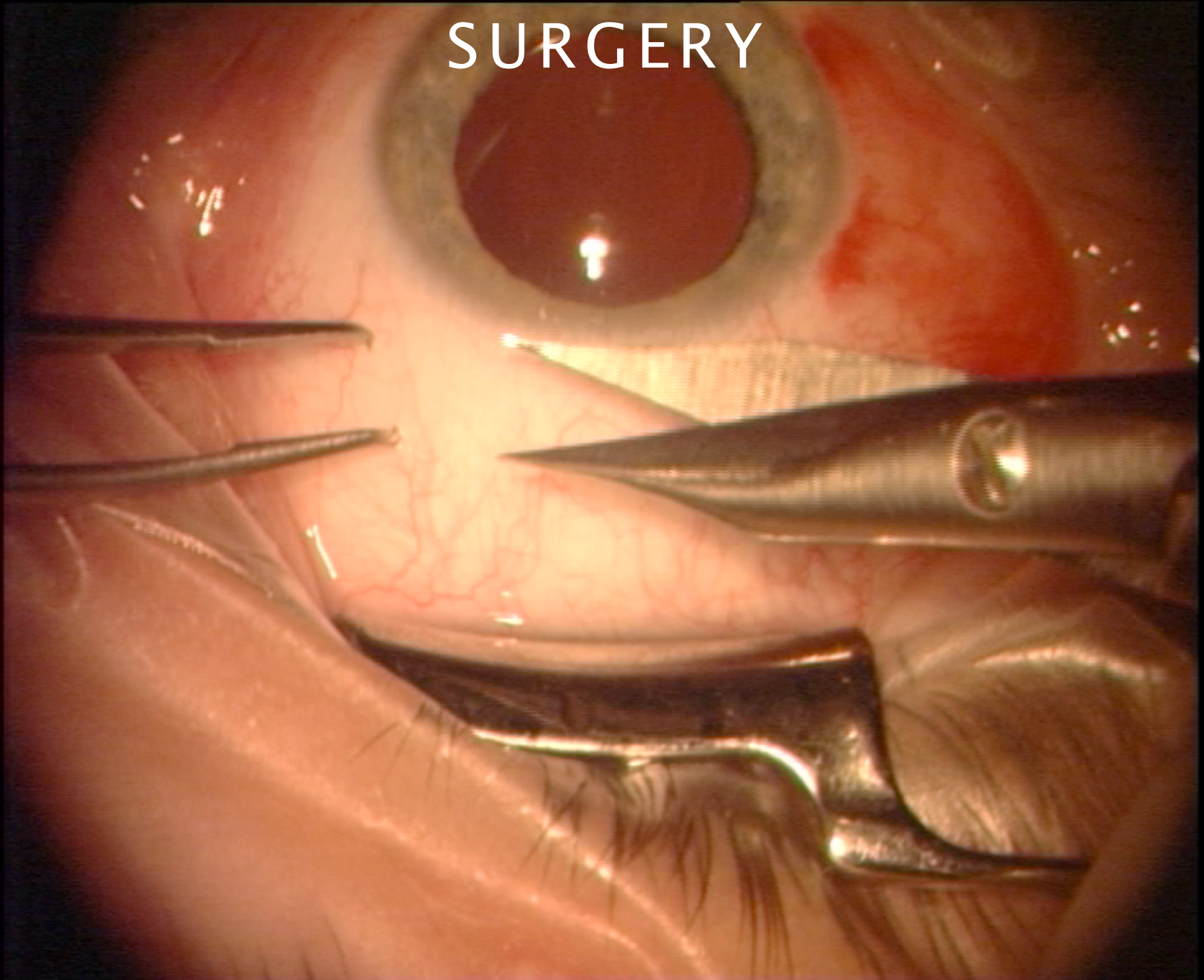
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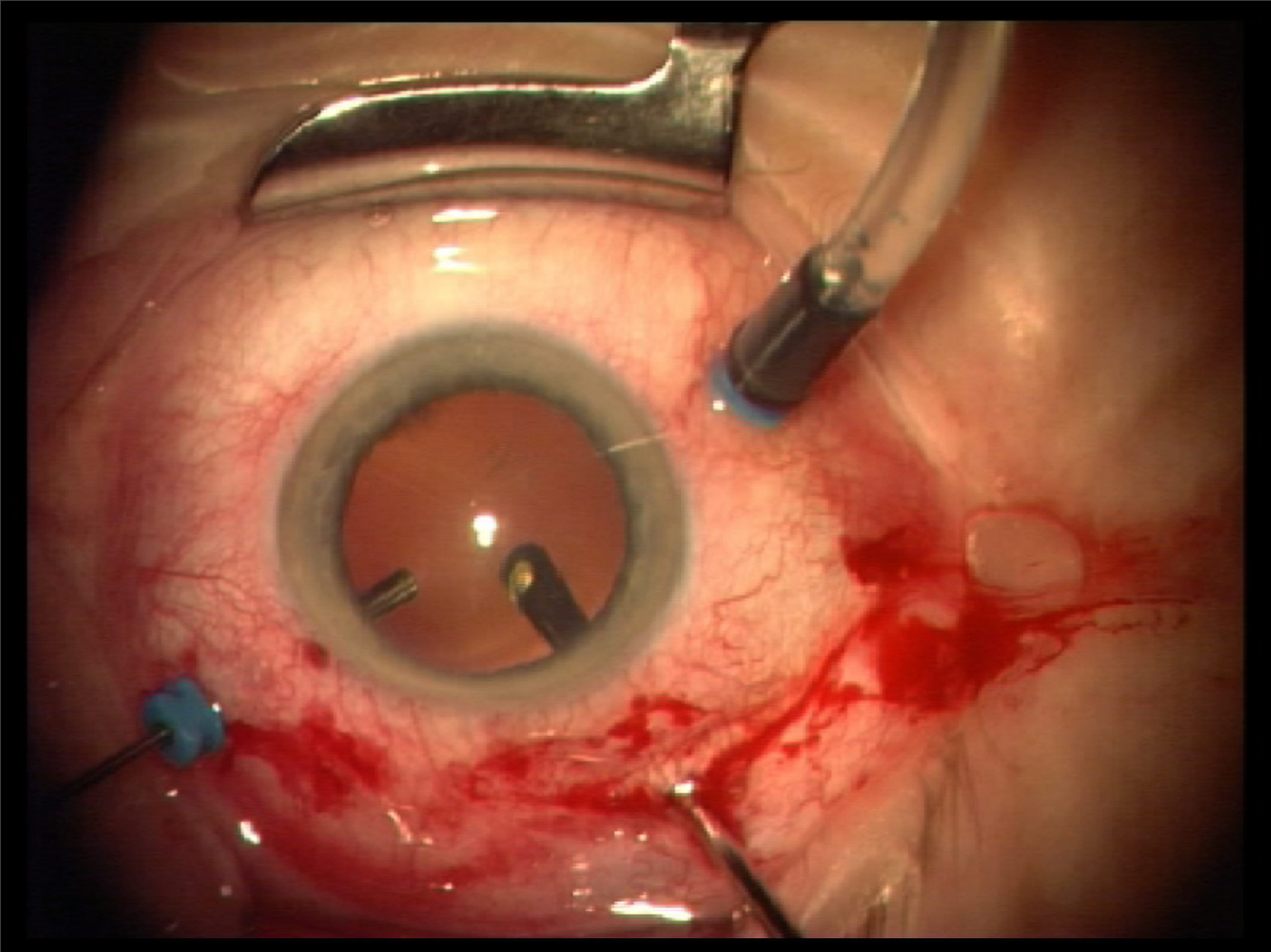


How?

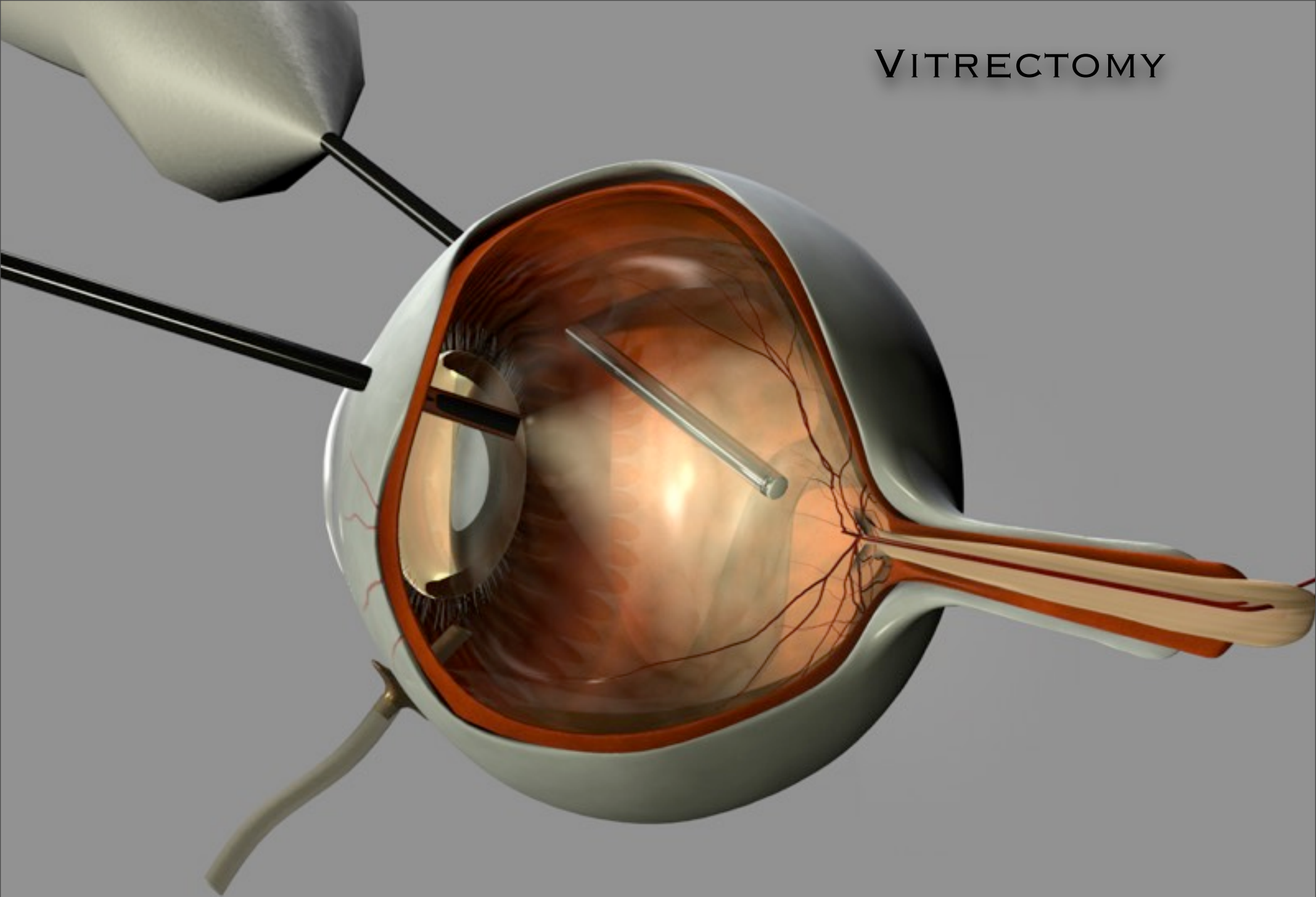


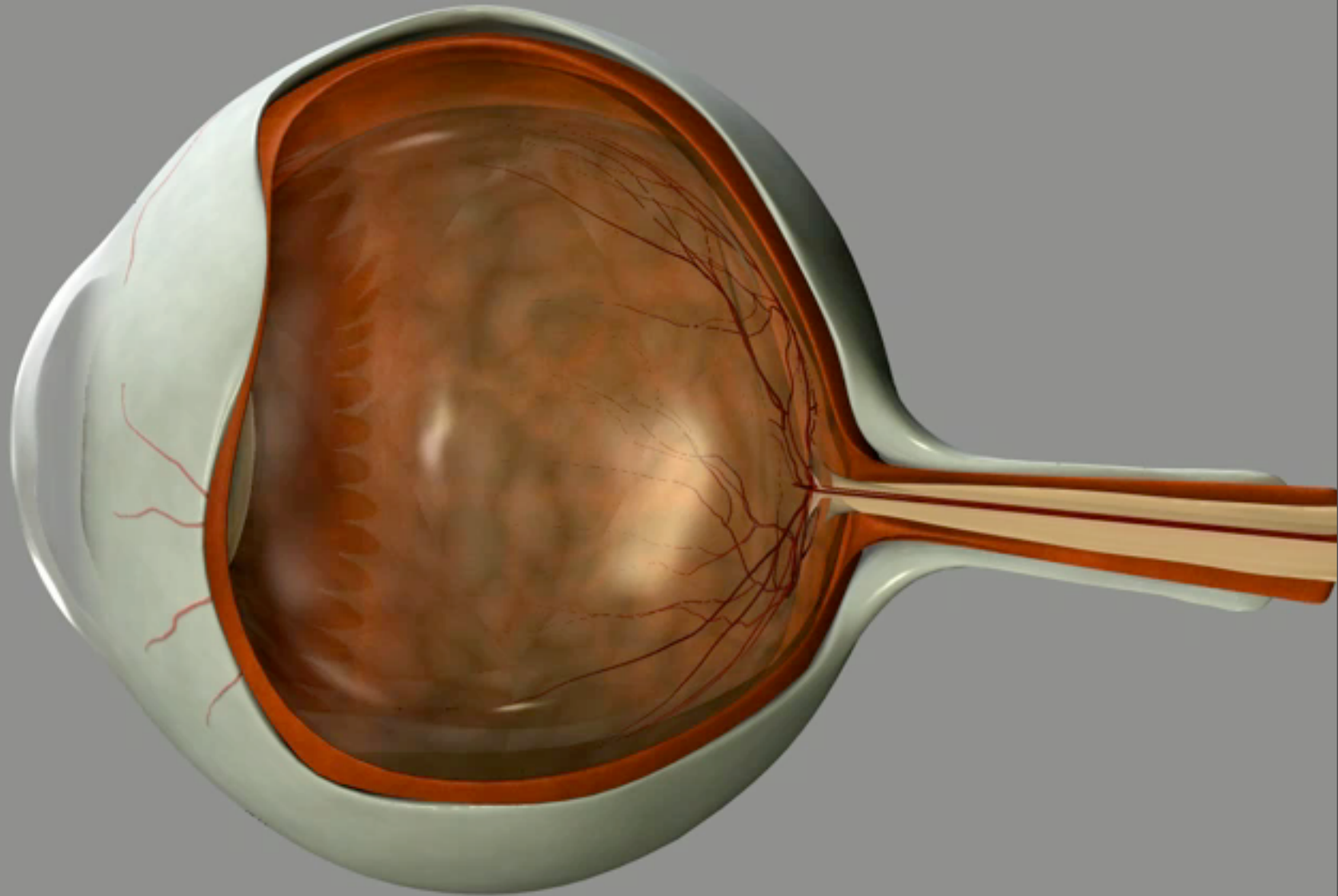
SURGERY



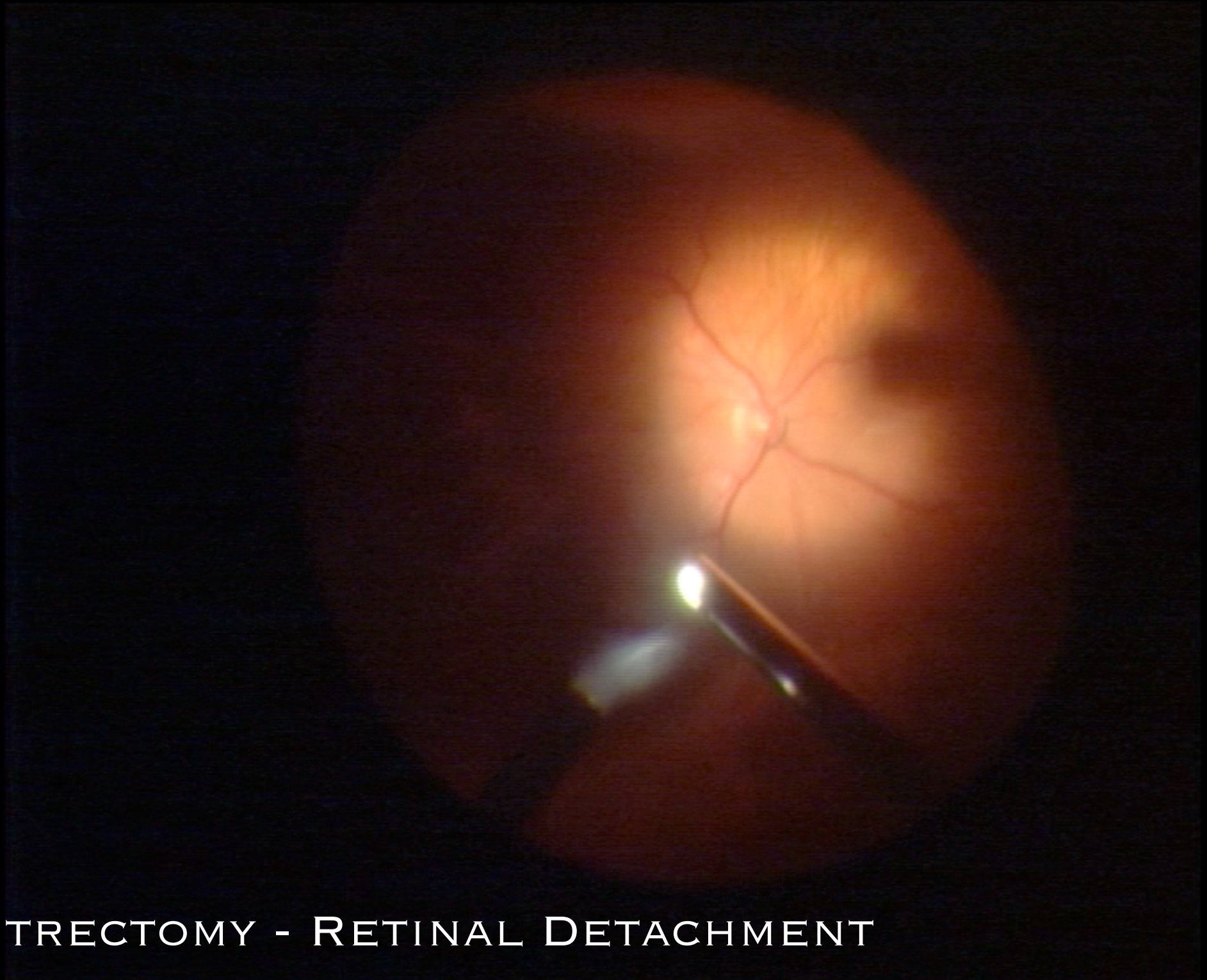


VITRECTOMY



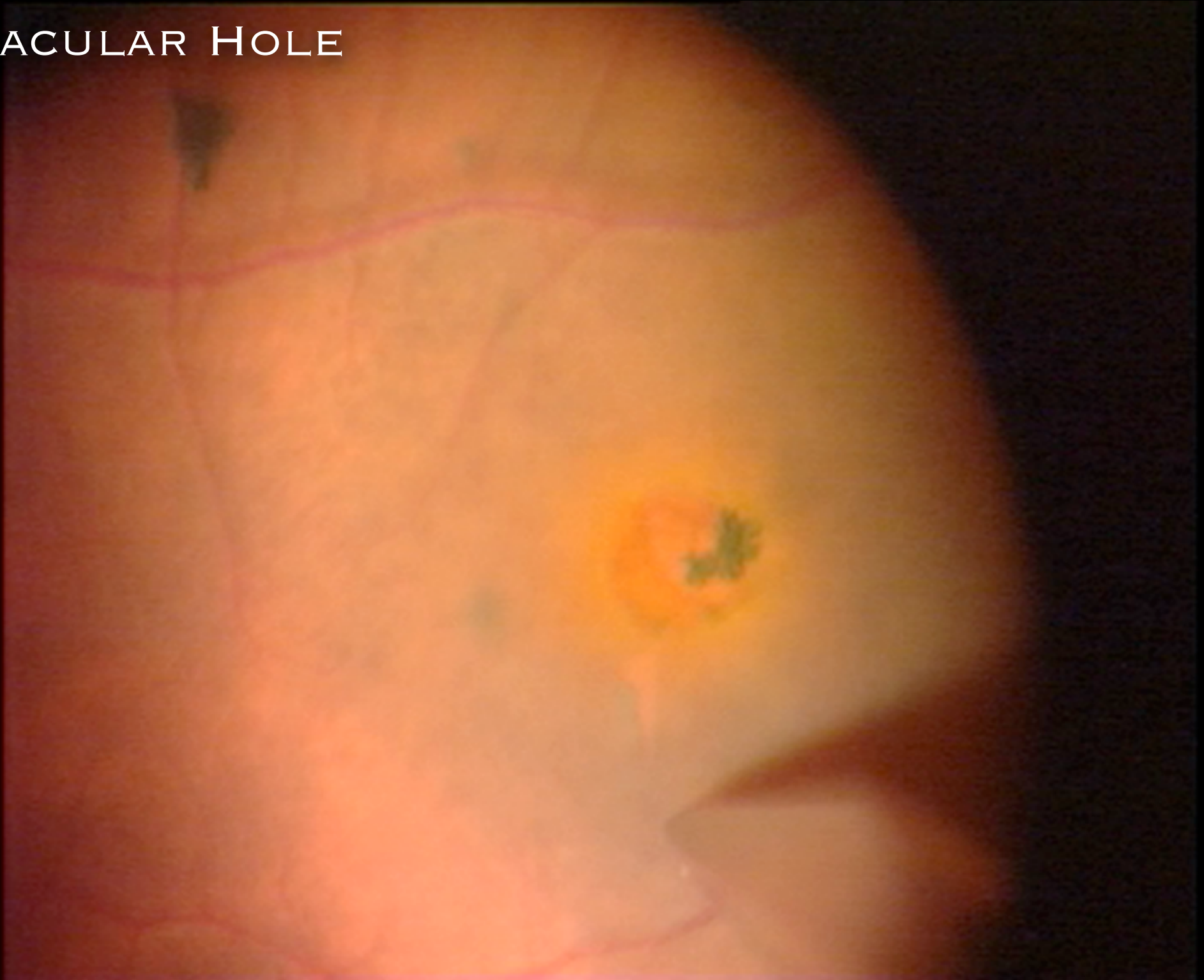


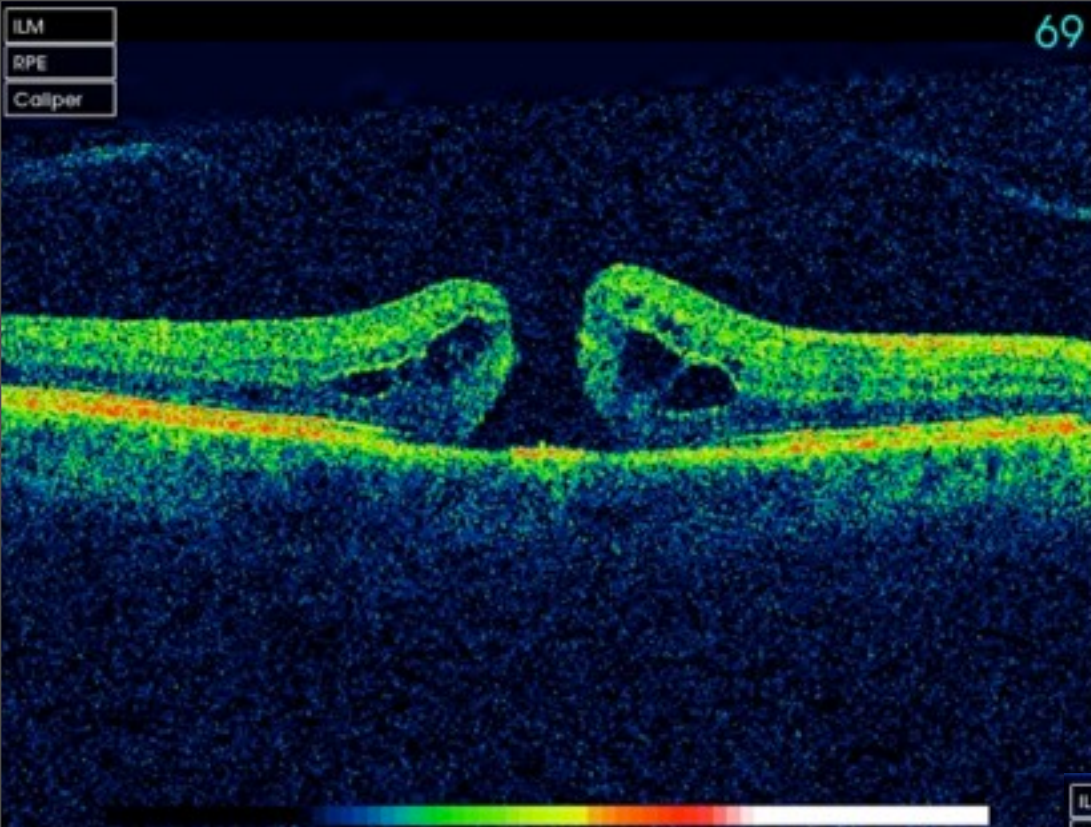
RETINAL DETACHMENT



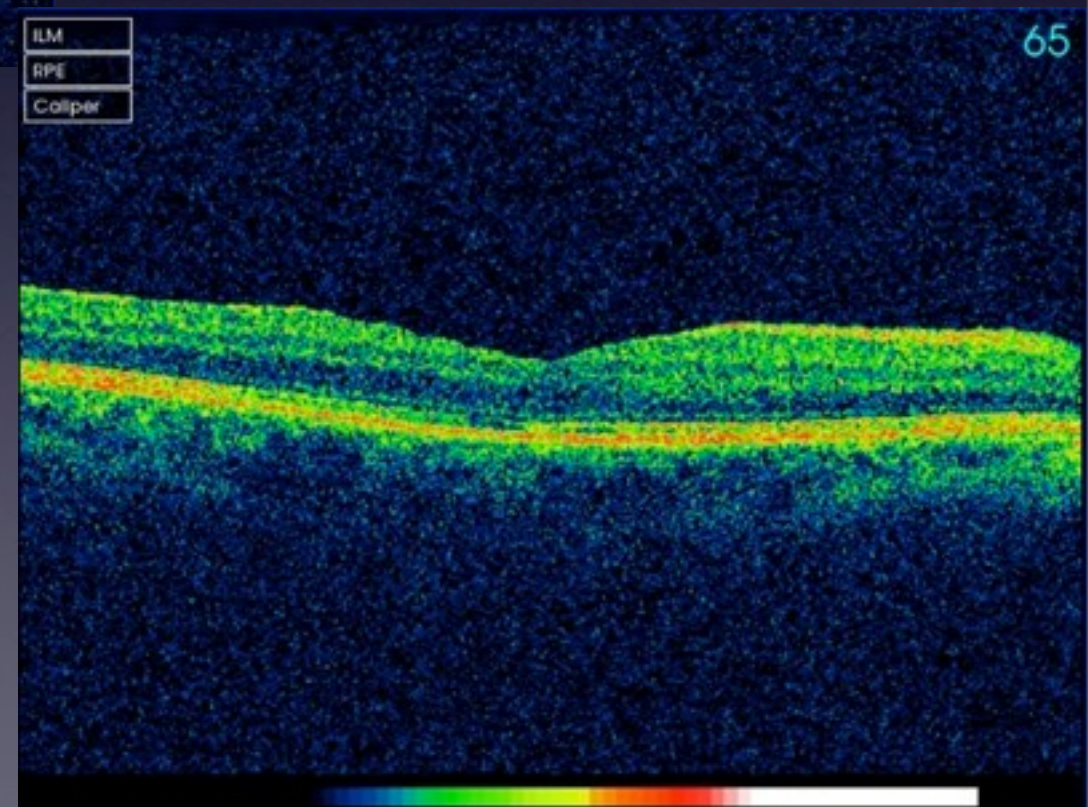
VITRECTOMY - RETINAL DETACHMENT

MACULAR HOLE

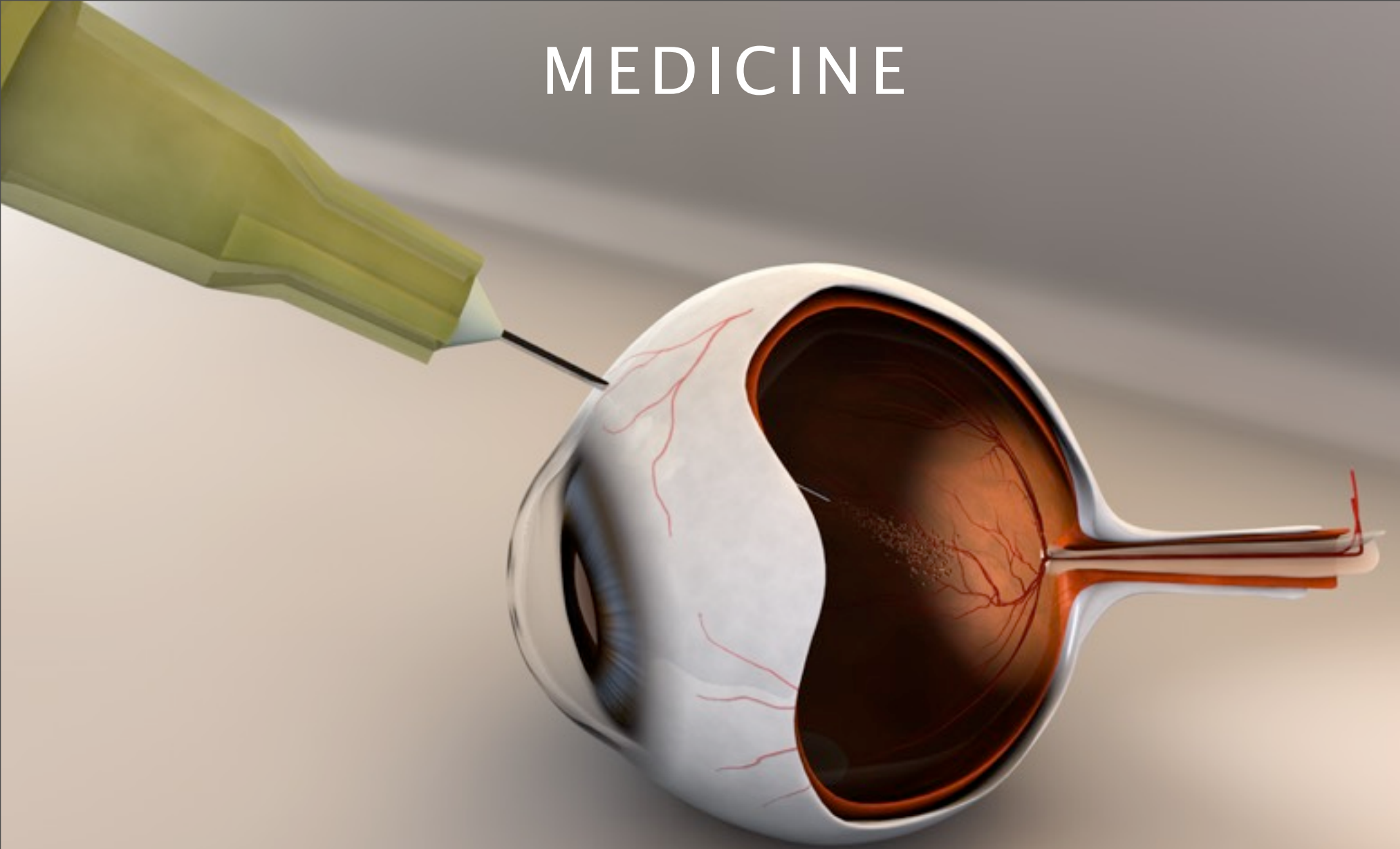




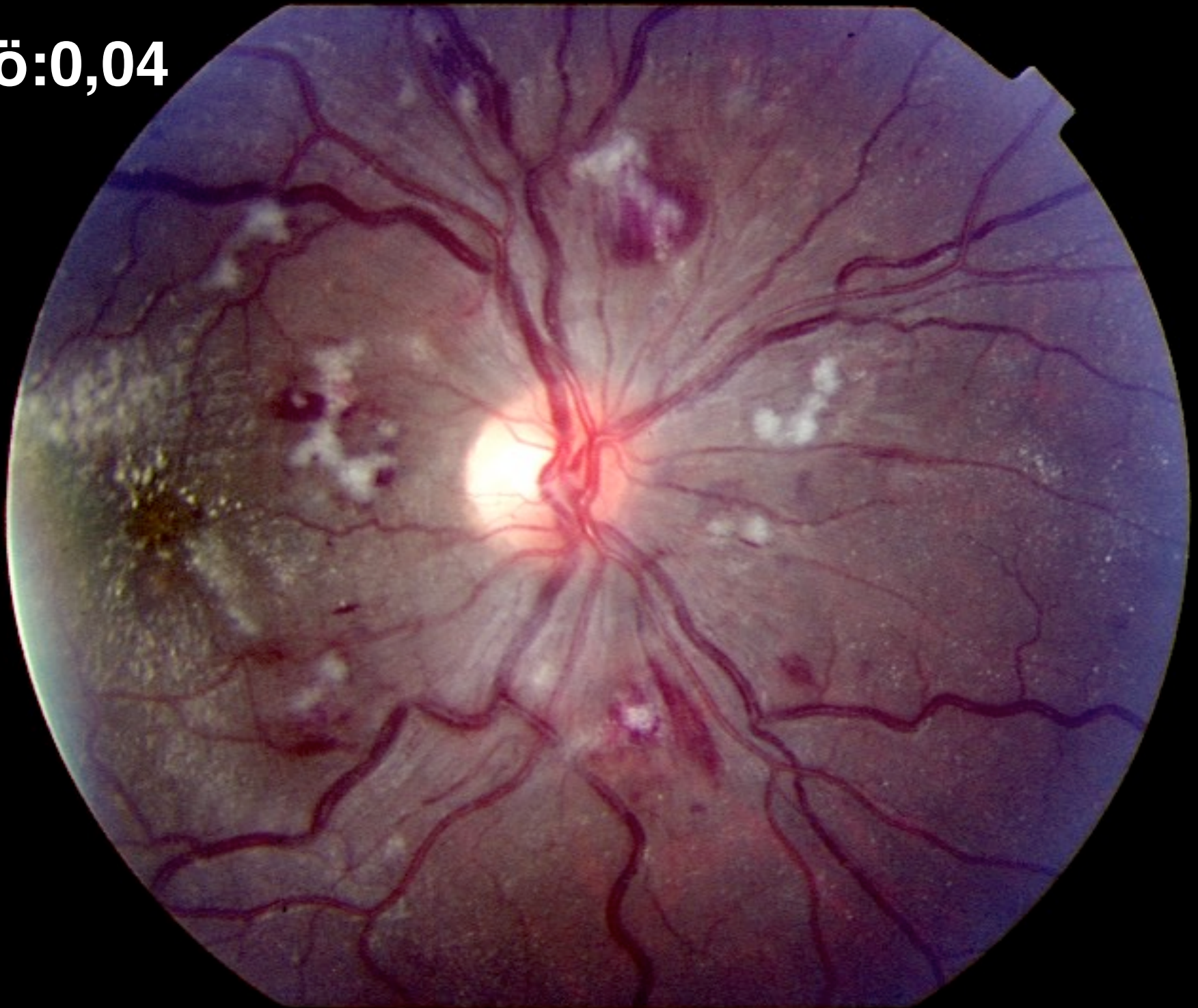
MACULAR HOLE



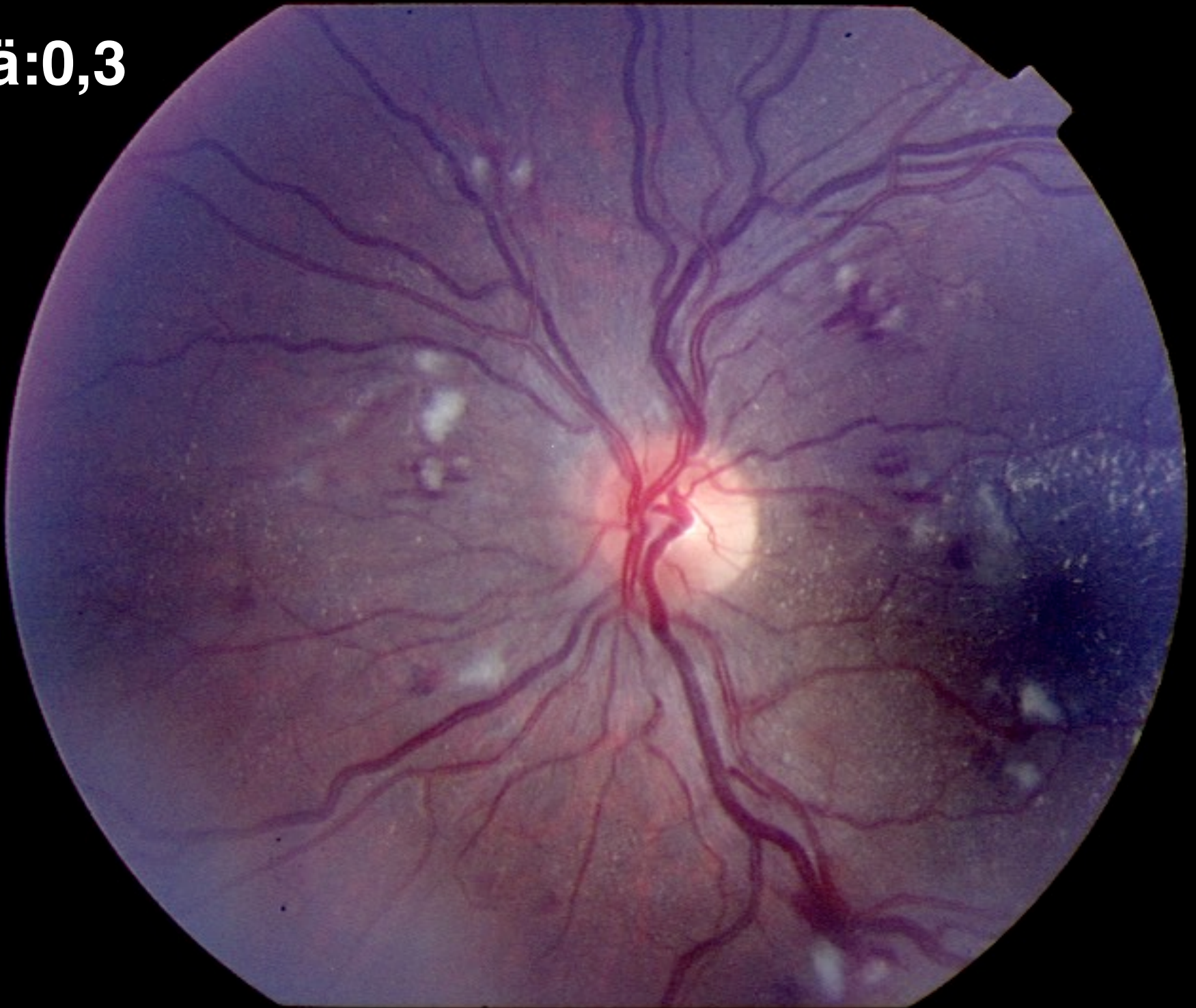
MEDICINE

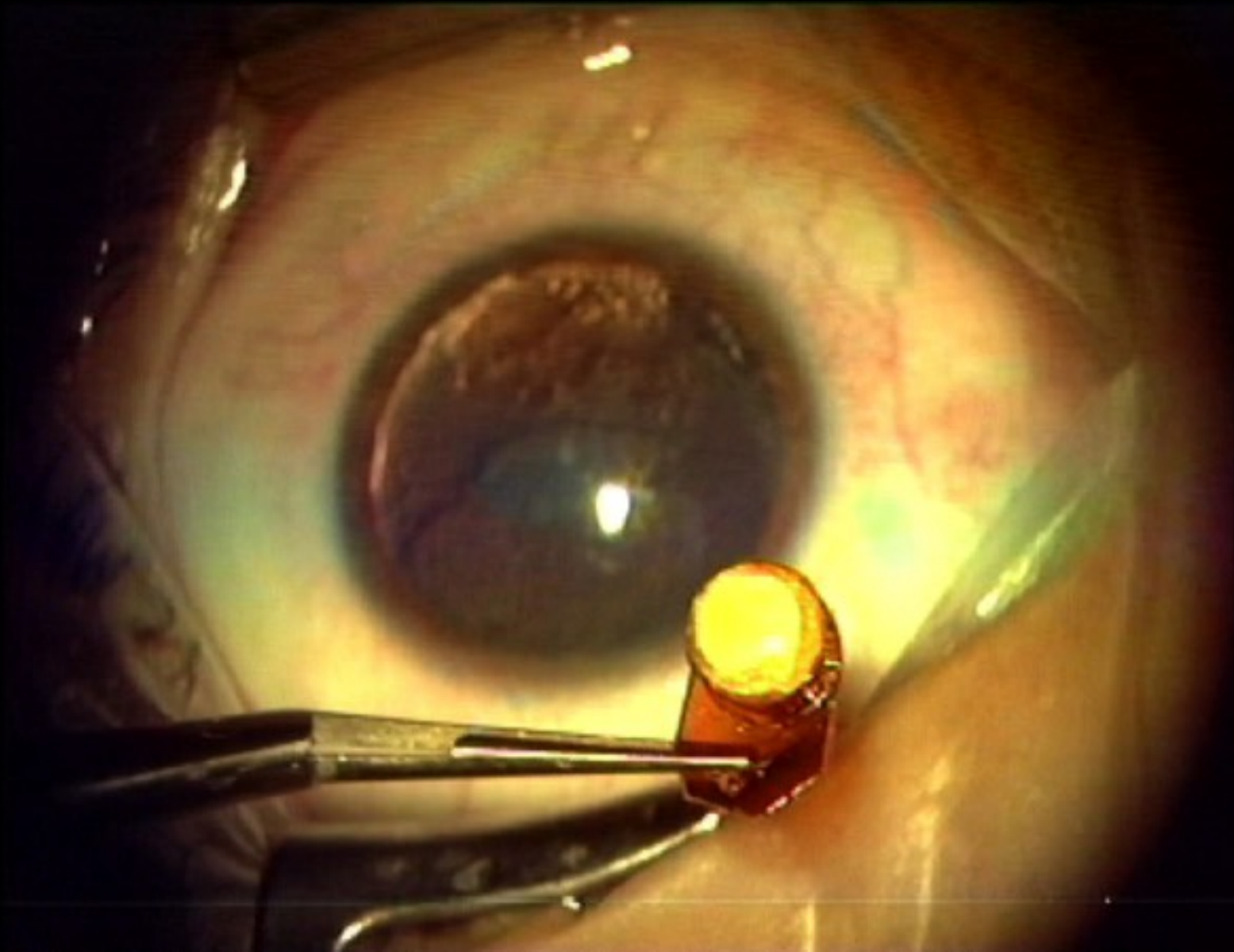


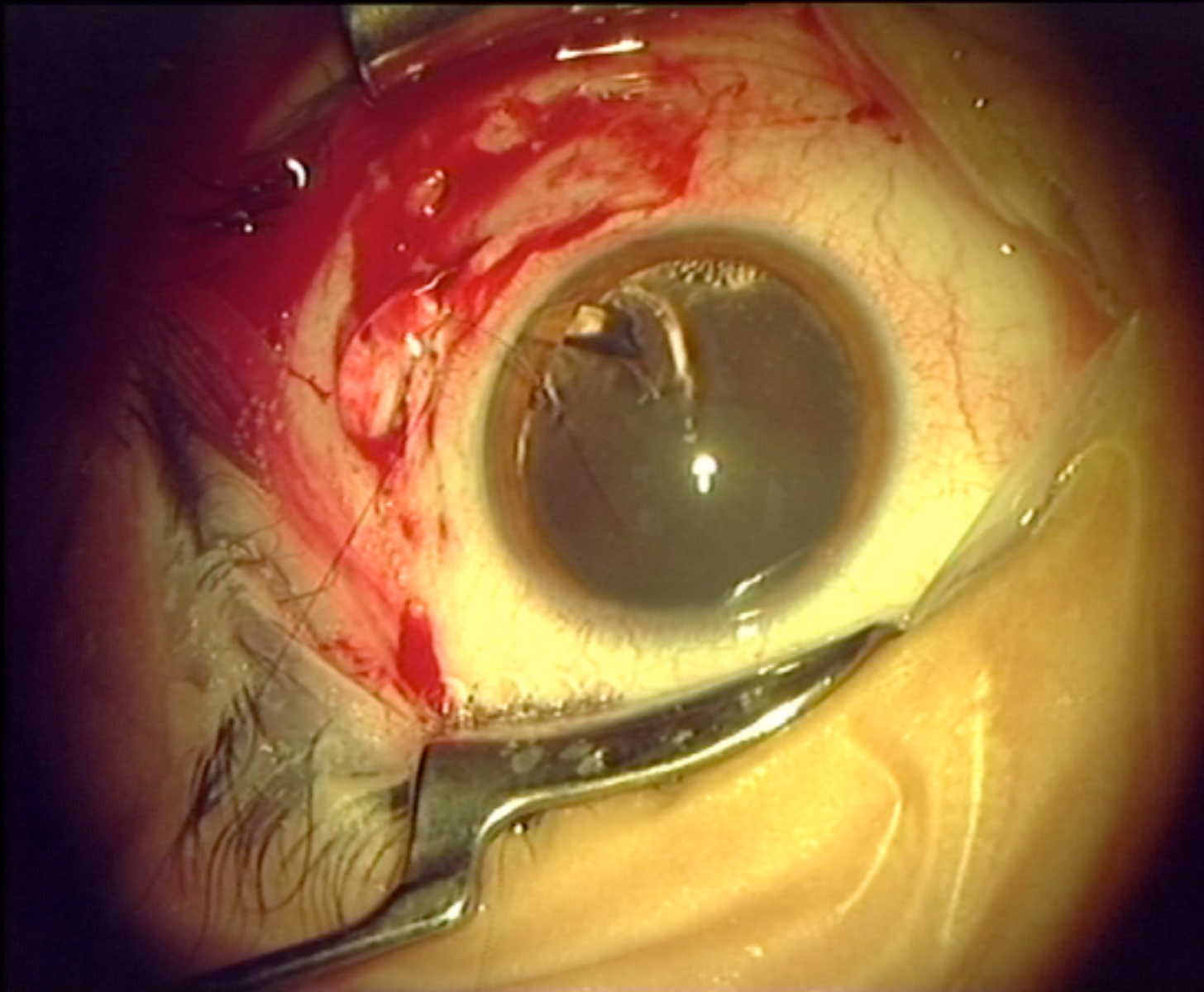
S Hö:0,04



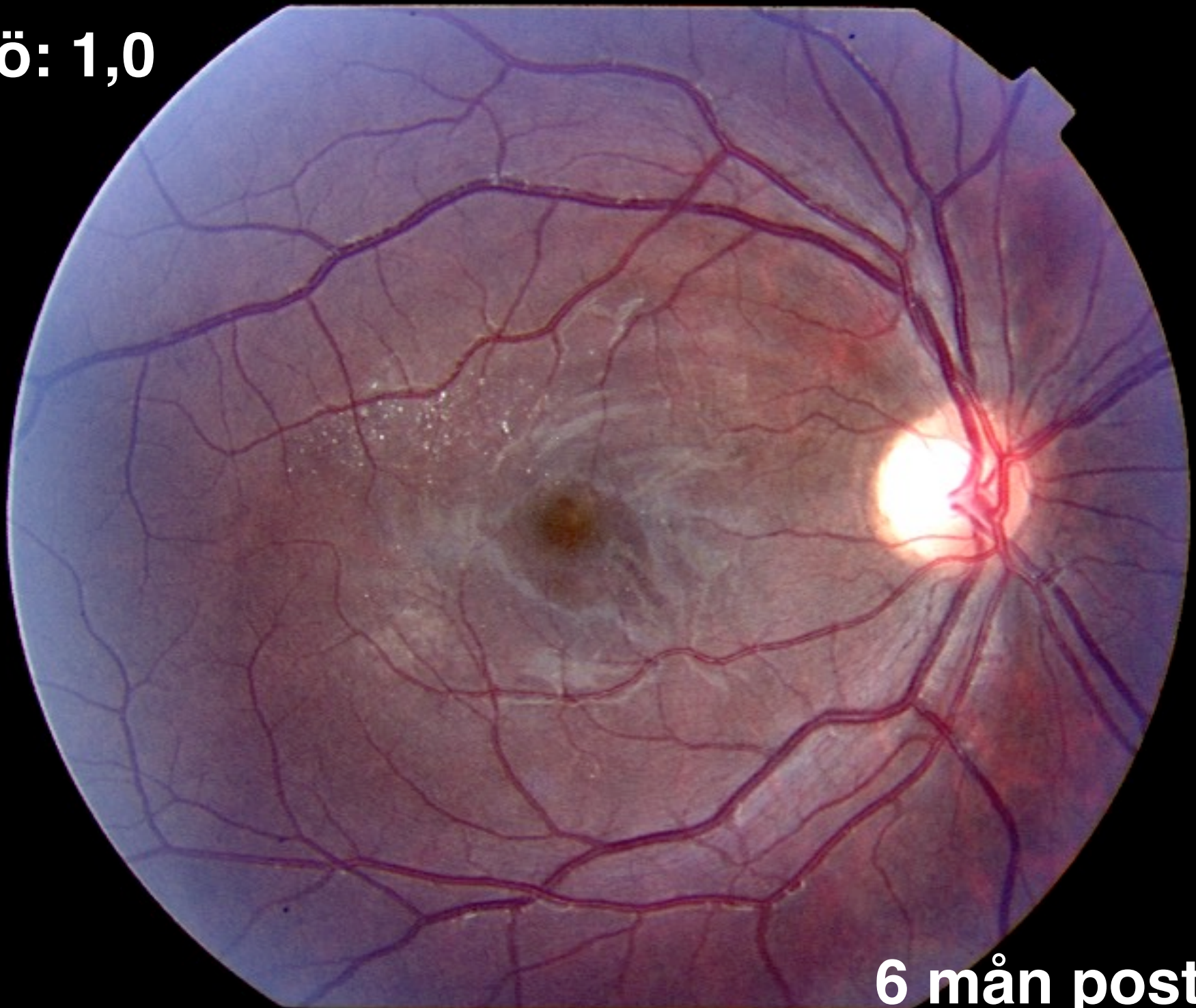
S Vä:0,3





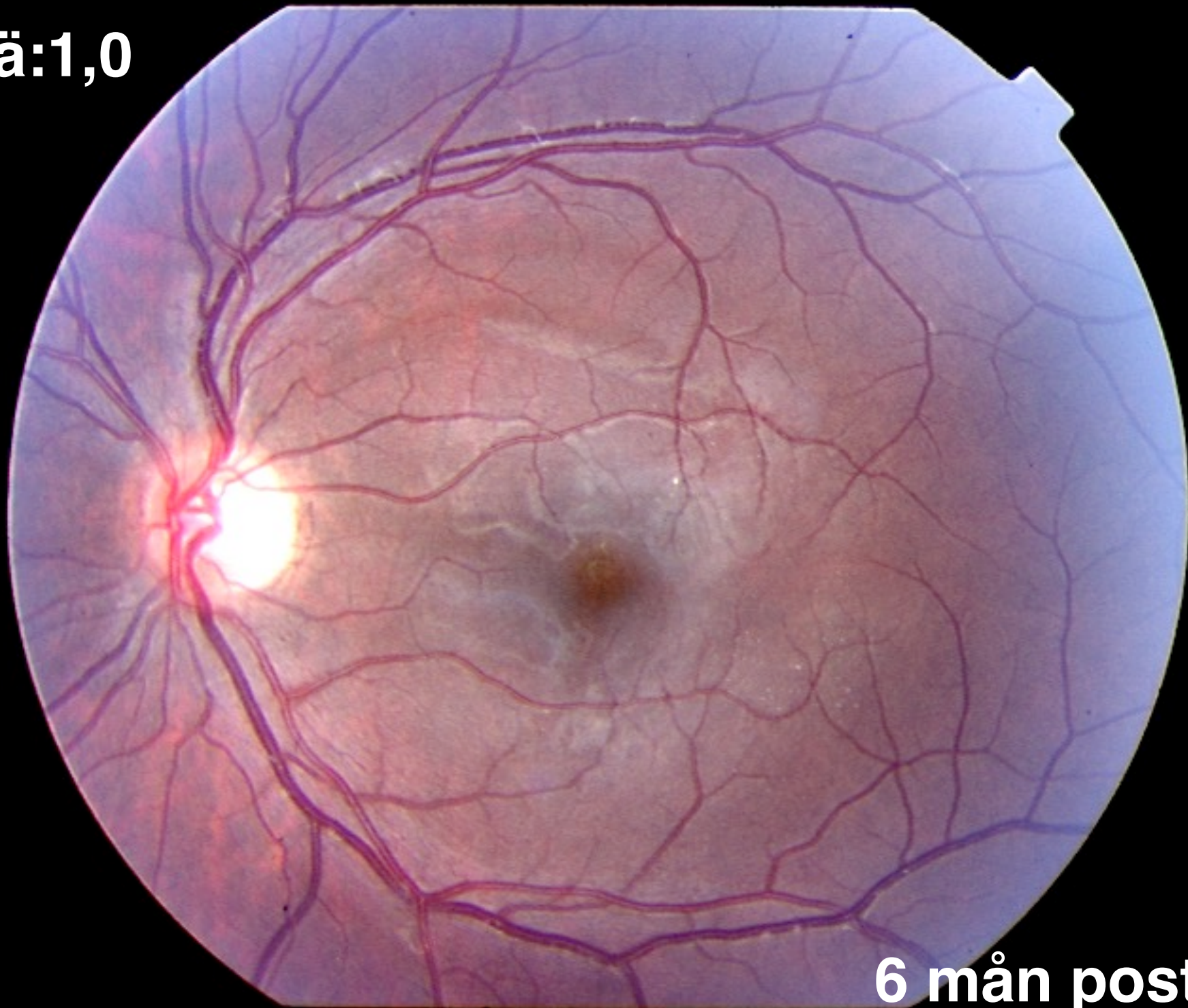


S Hö: 1,0



6 mån postop

S Vä:1,0



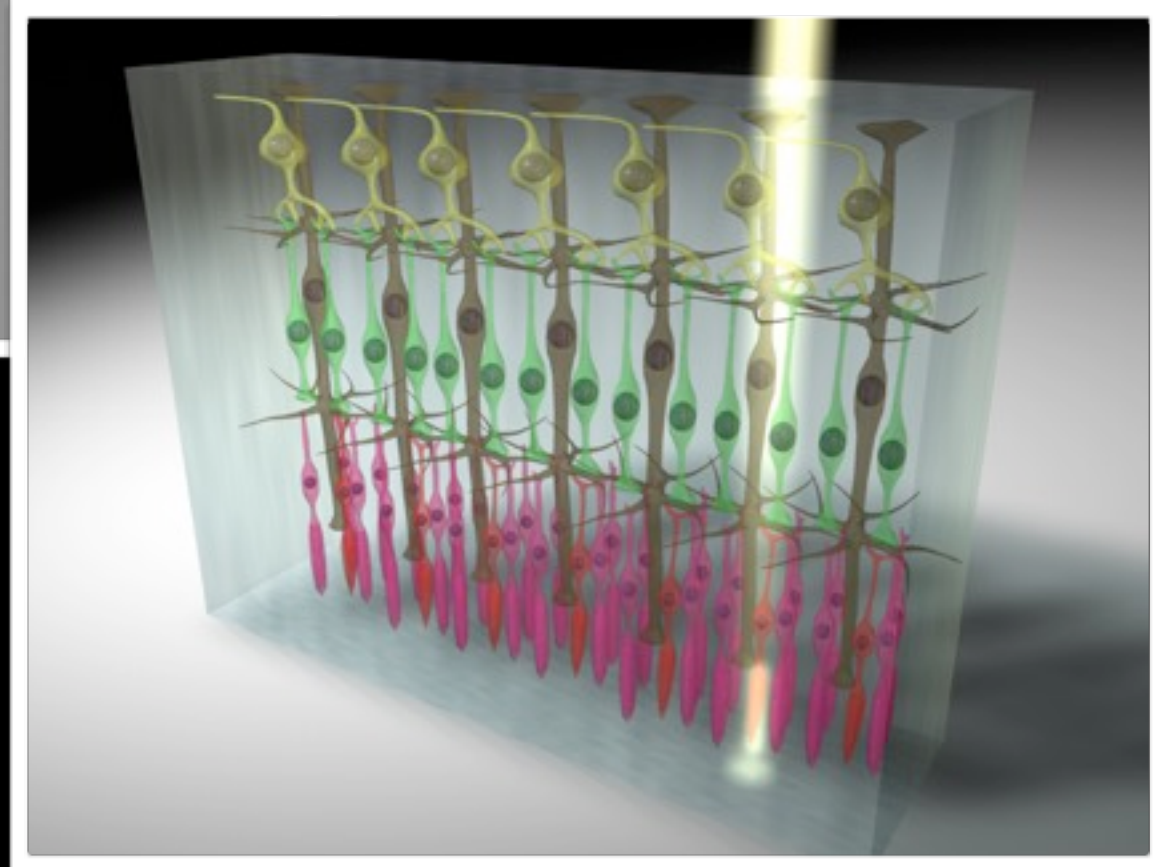
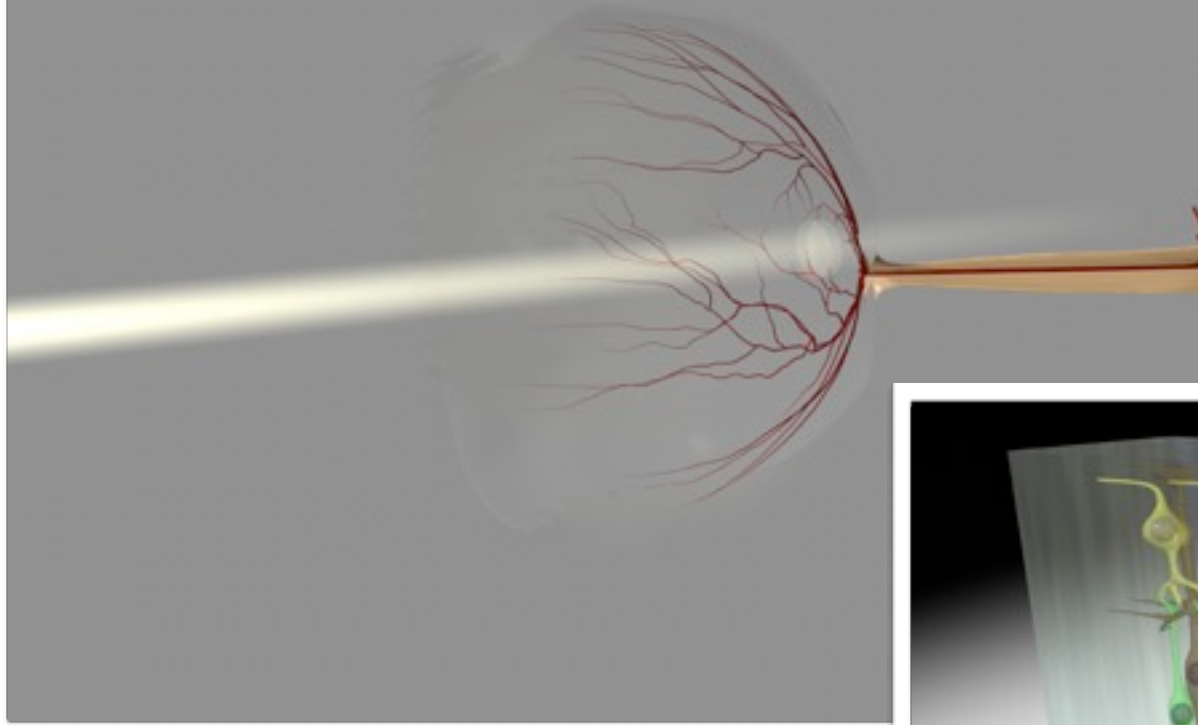
6 mån postop

RETINA

— TODAY

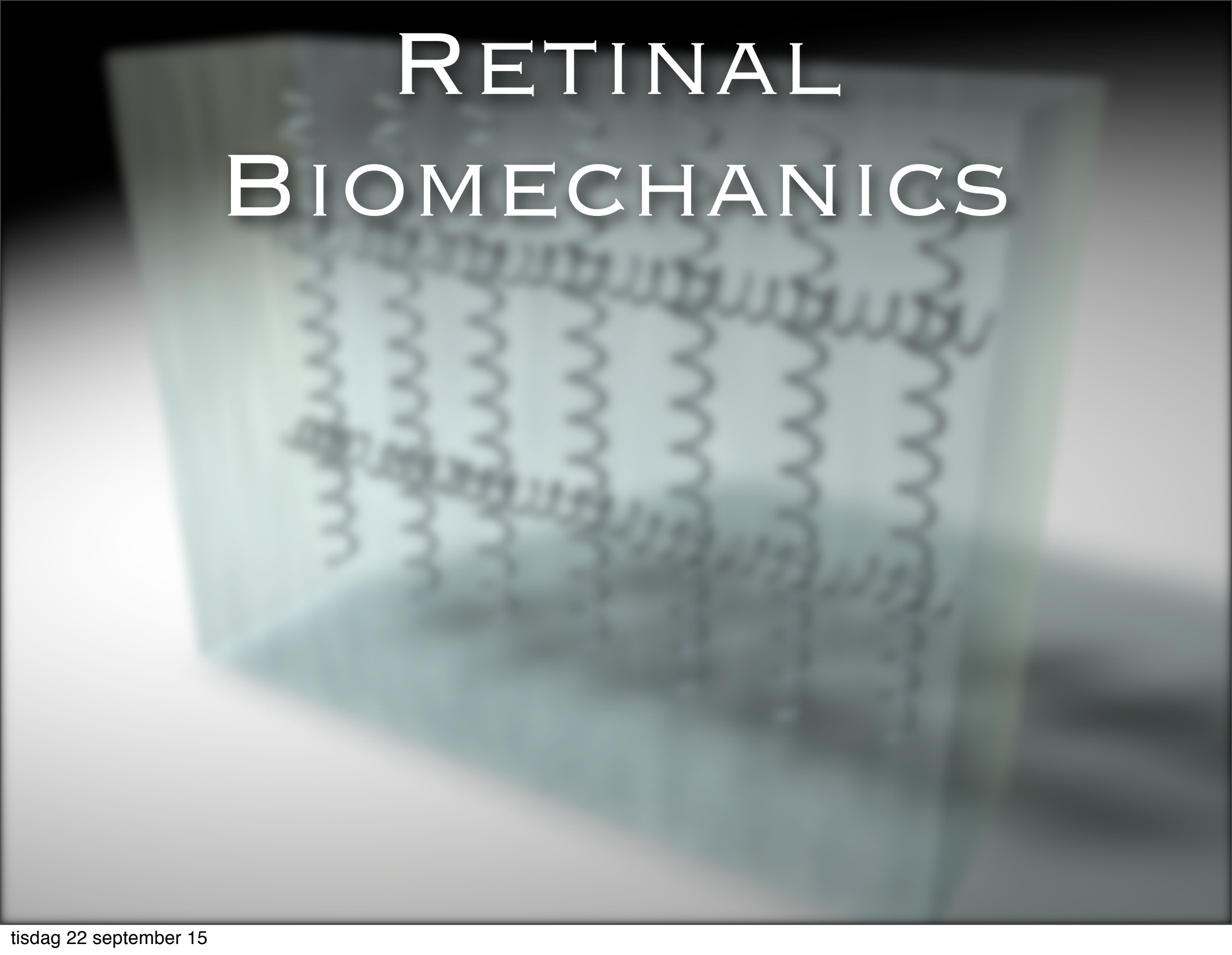


RETINA - TOMORROW?



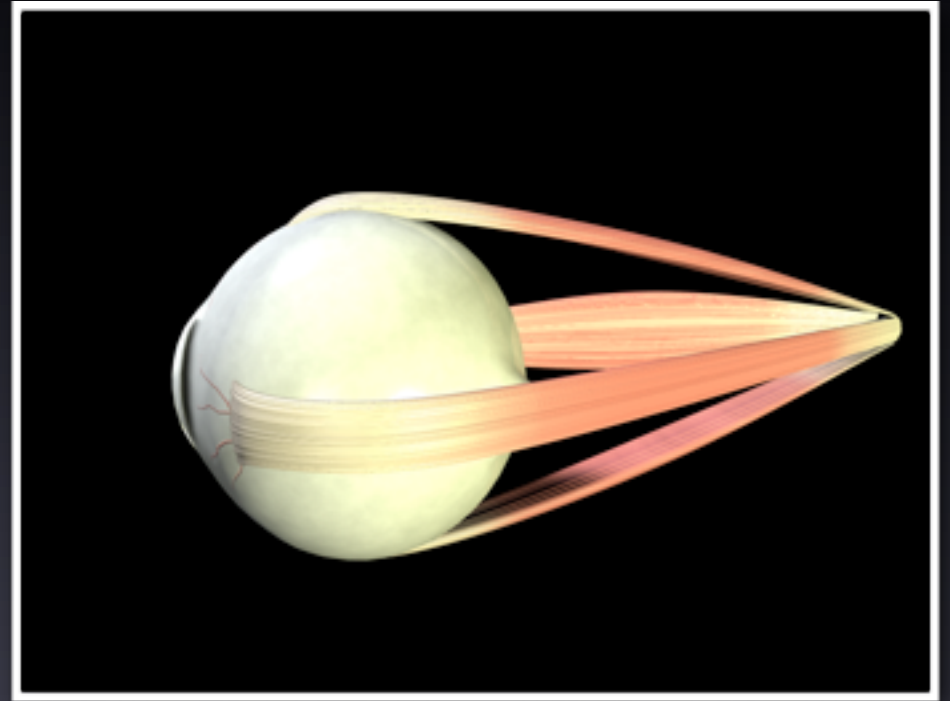
I. WHY DO RETINAL
CELLS DIE IN DISEASE?

RETINAL BIOMECHANICS

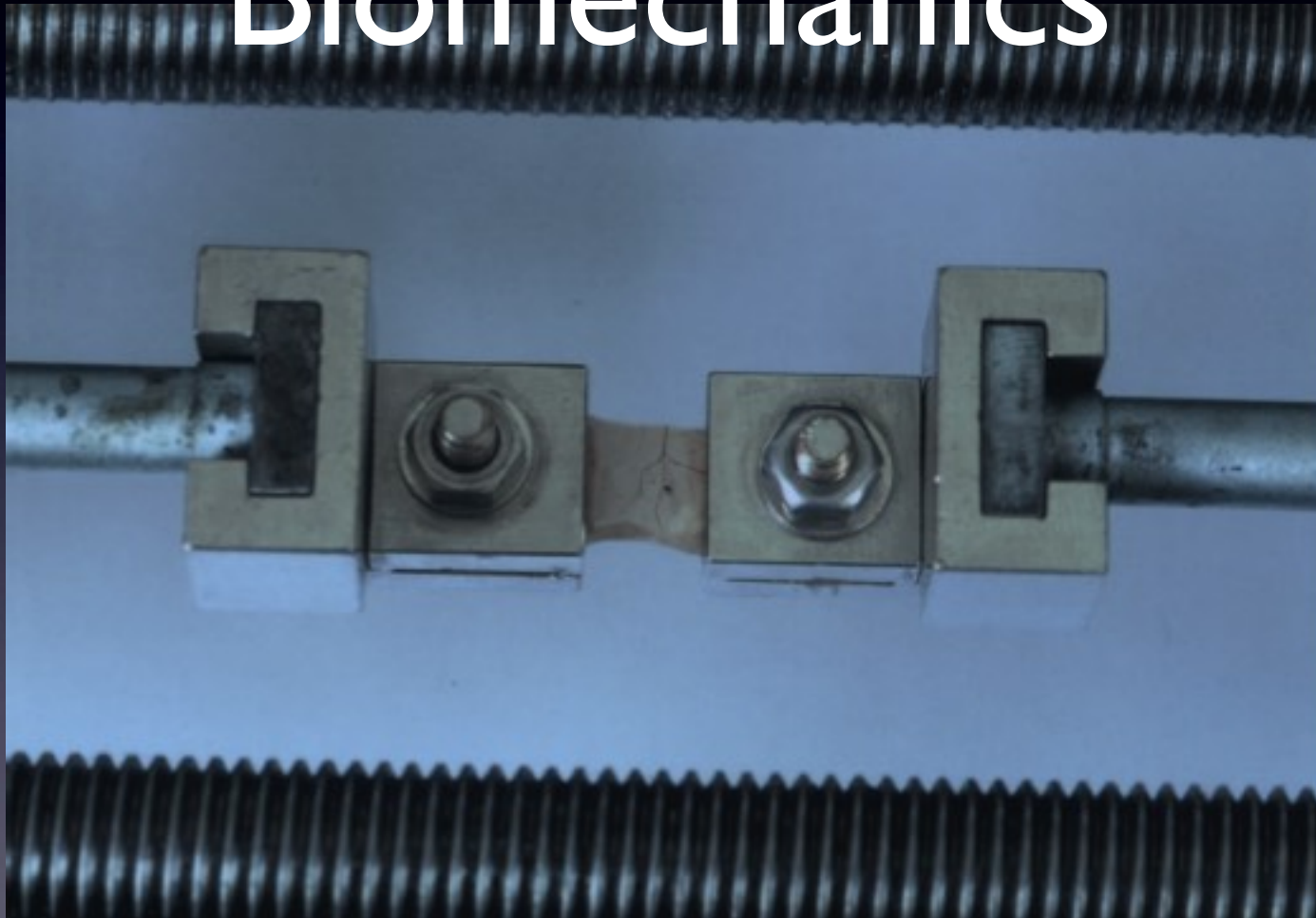


Biomechanics

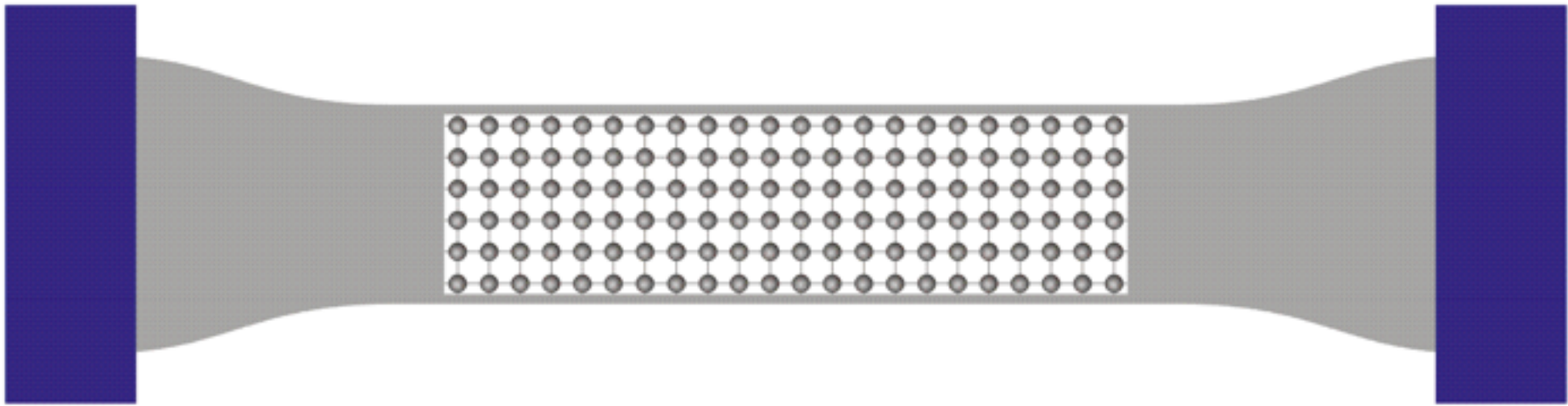
- Engineering + Biology
- Physical forces $\Leftrightarrow$ Tissues
 - Gravity
 - Pressure
 - Tension - Elasticity



Retinal Biomechanics



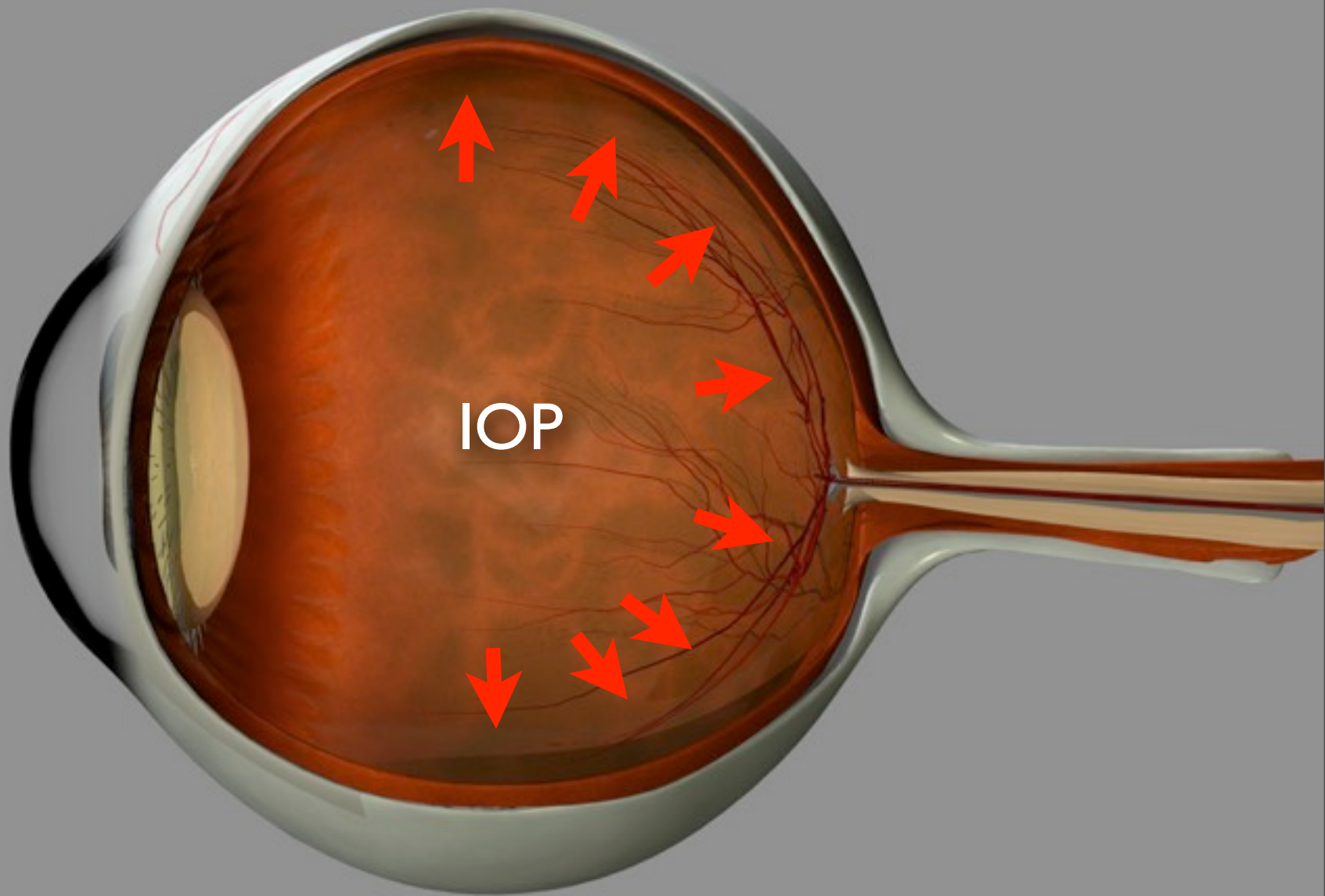
WOLLENSAK. RETINA 2004

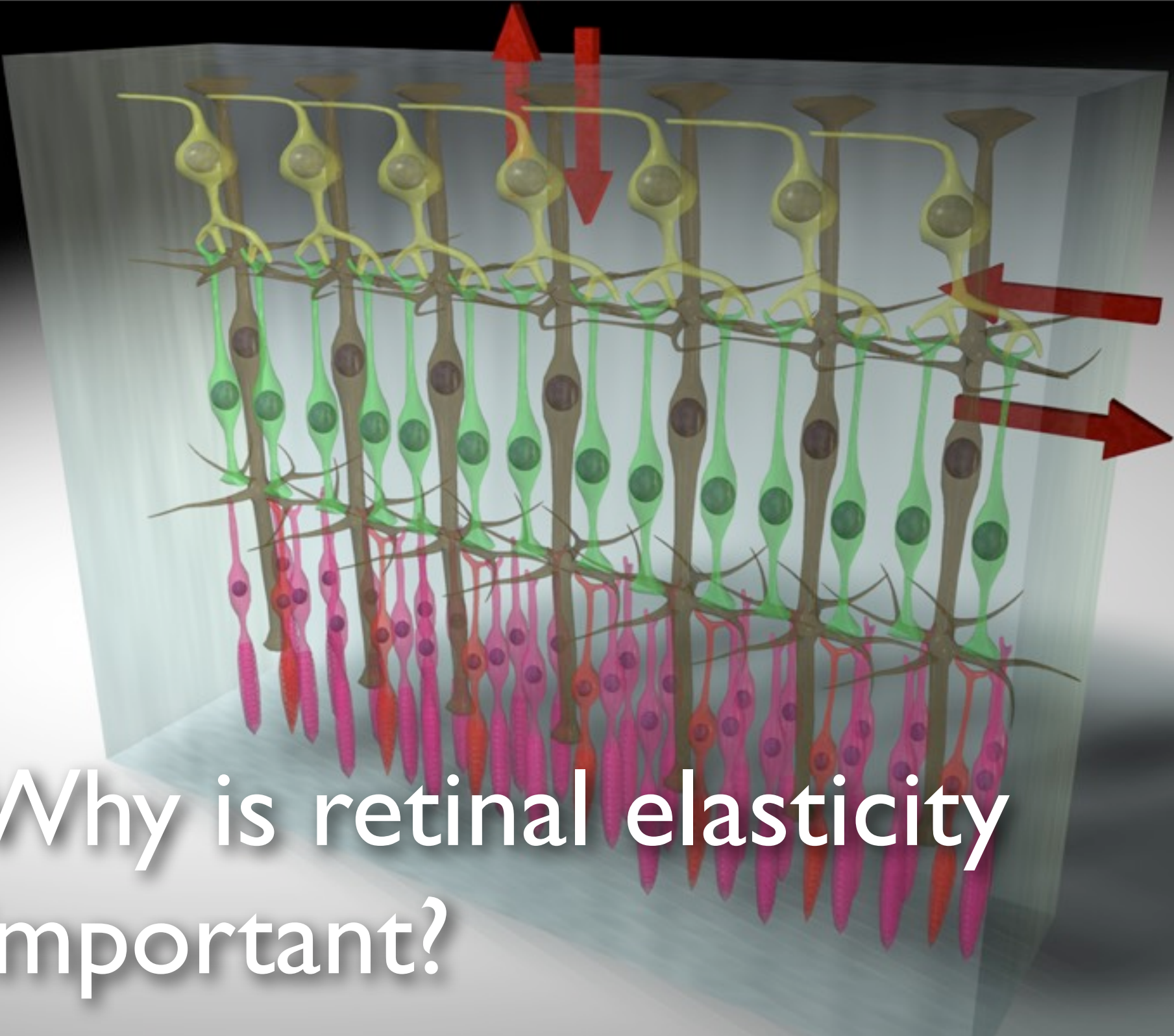


© D. M. Kochmann (2009)

THE RETINA IS STRETCHED DURING DEVELOPMENT

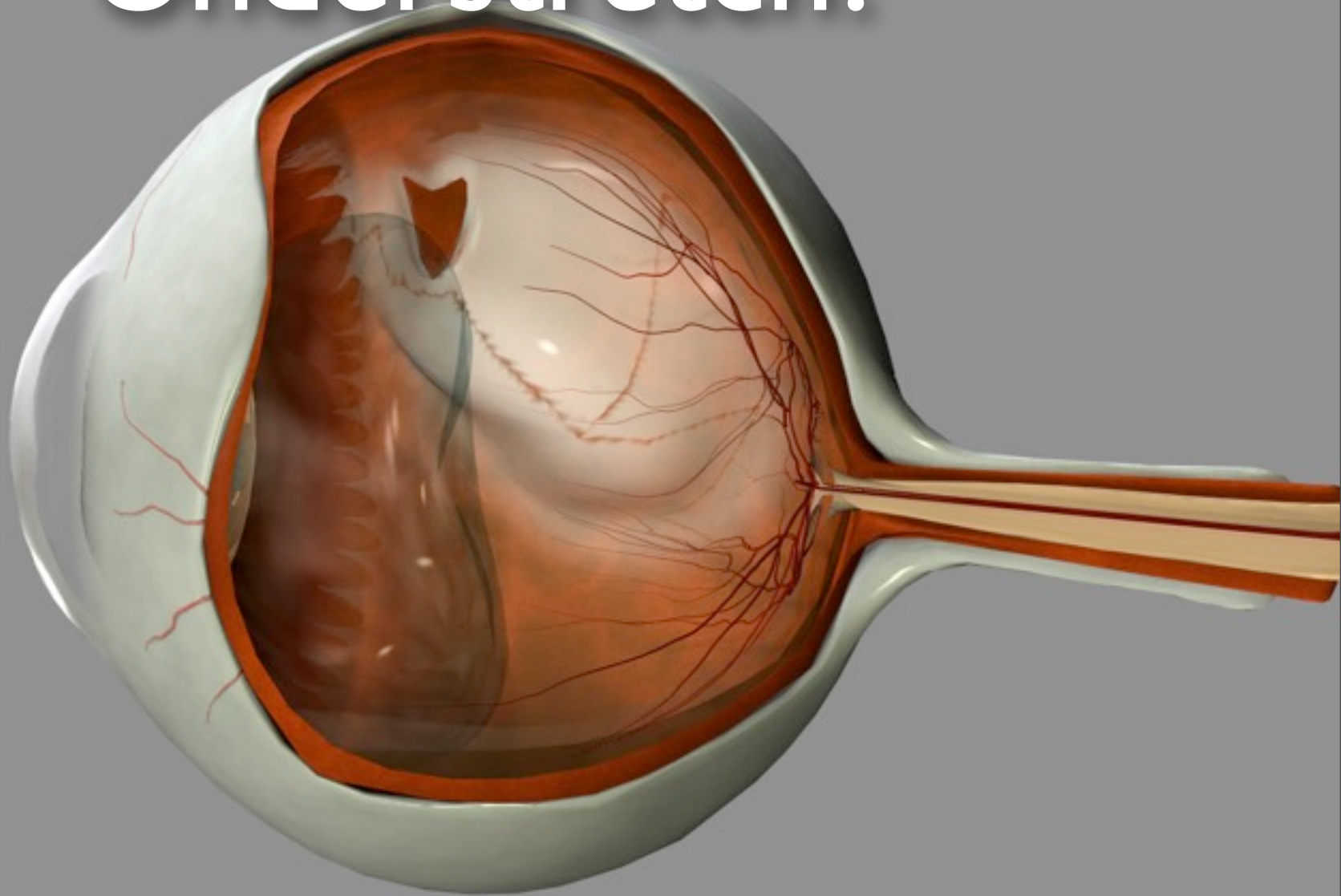
Reichenbach et al. Exp Eye Res 1991

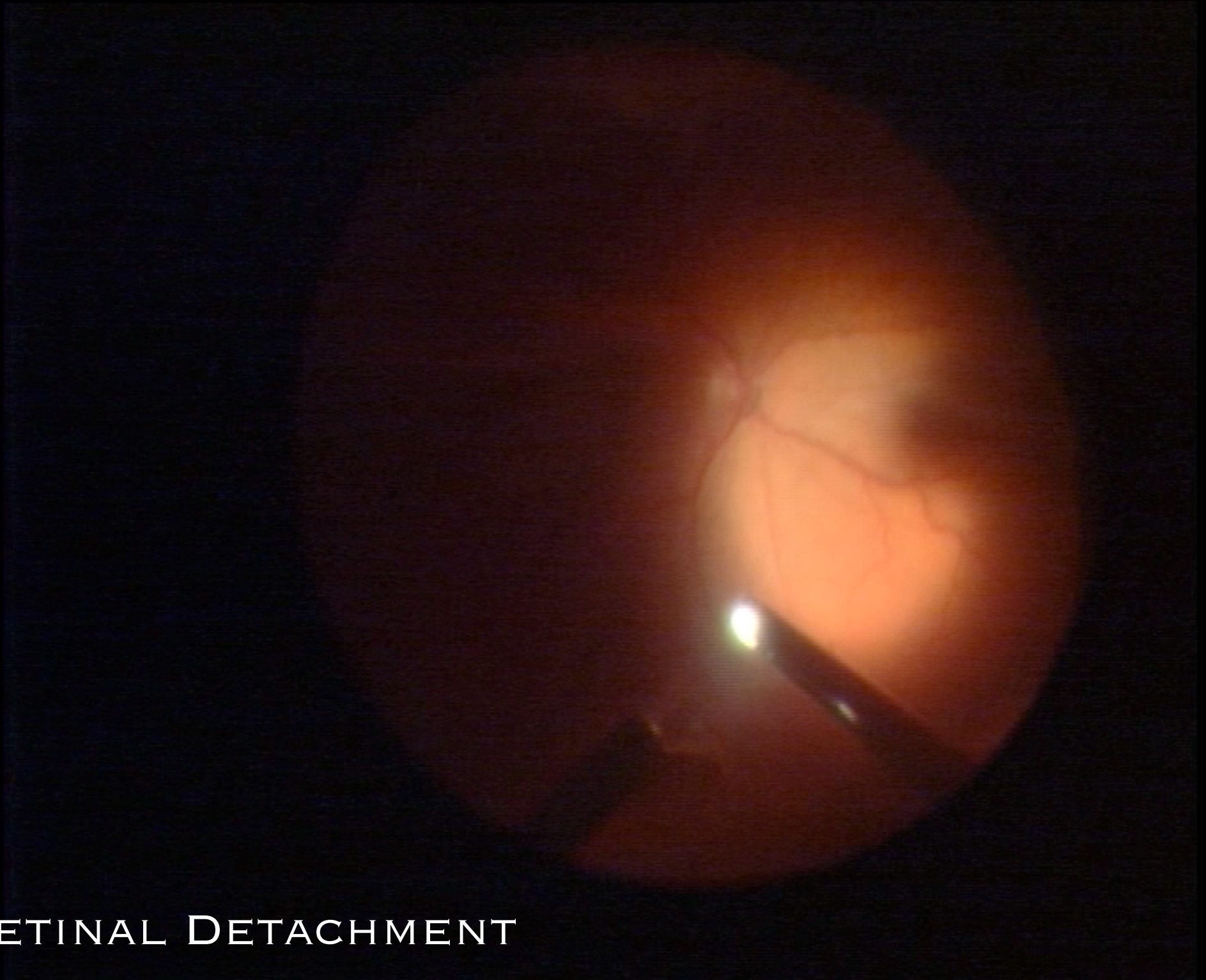




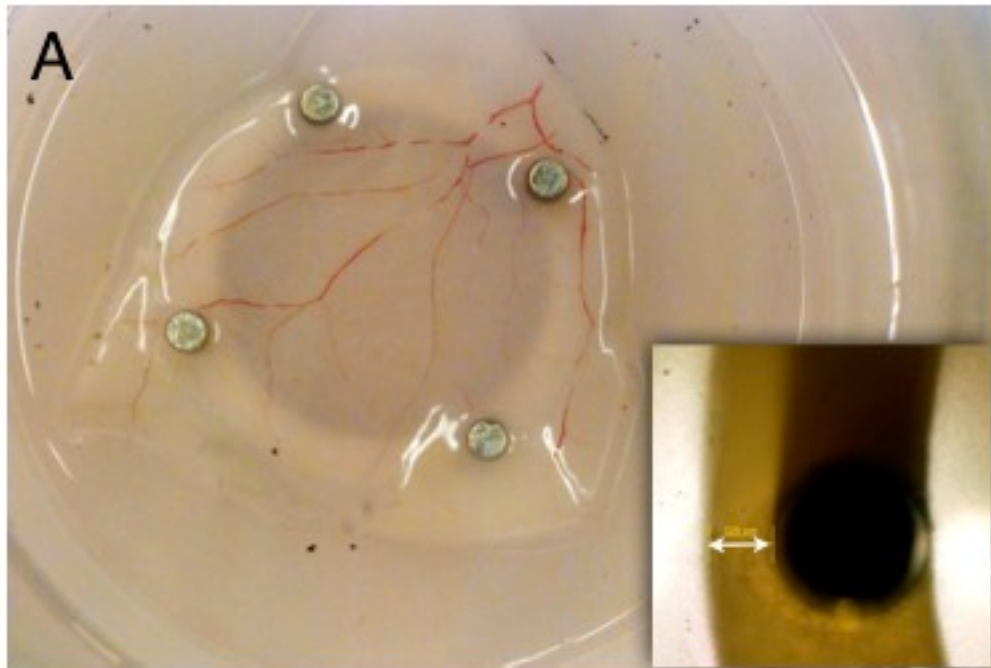
Why is retinal elasticity
important?

Understretch?

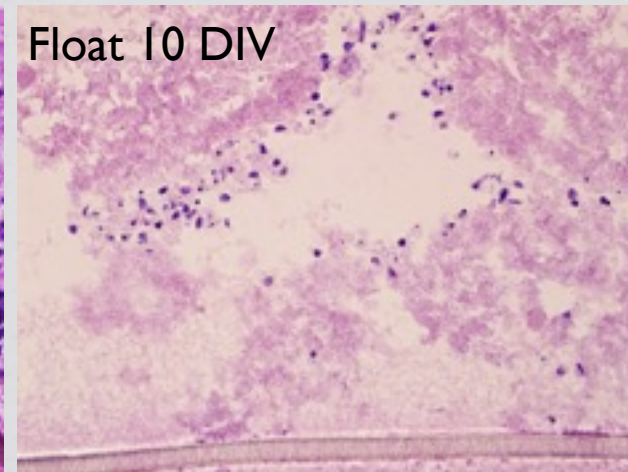
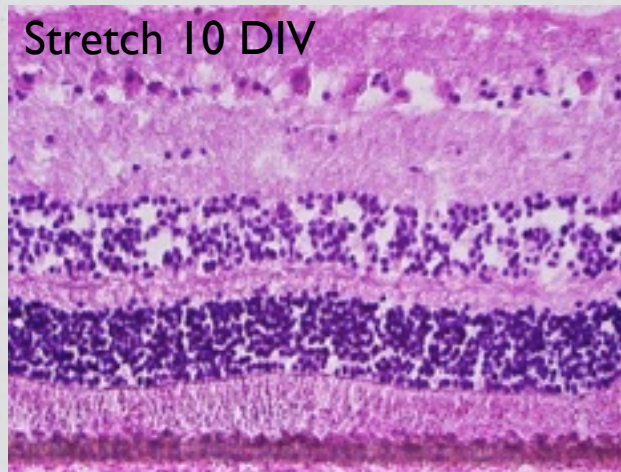
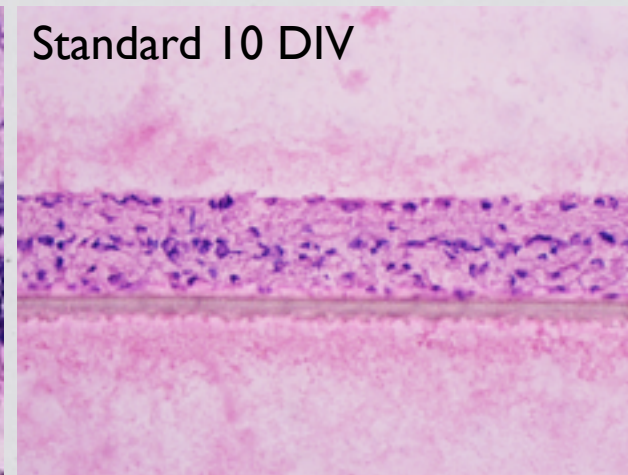
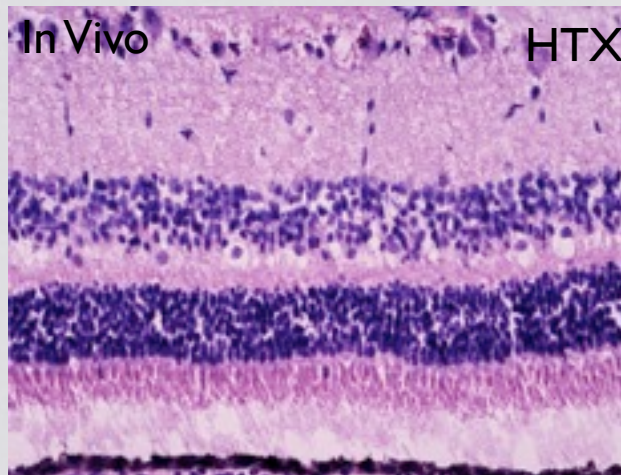




RETINAL DETACHMENT



Adult retina in vitro

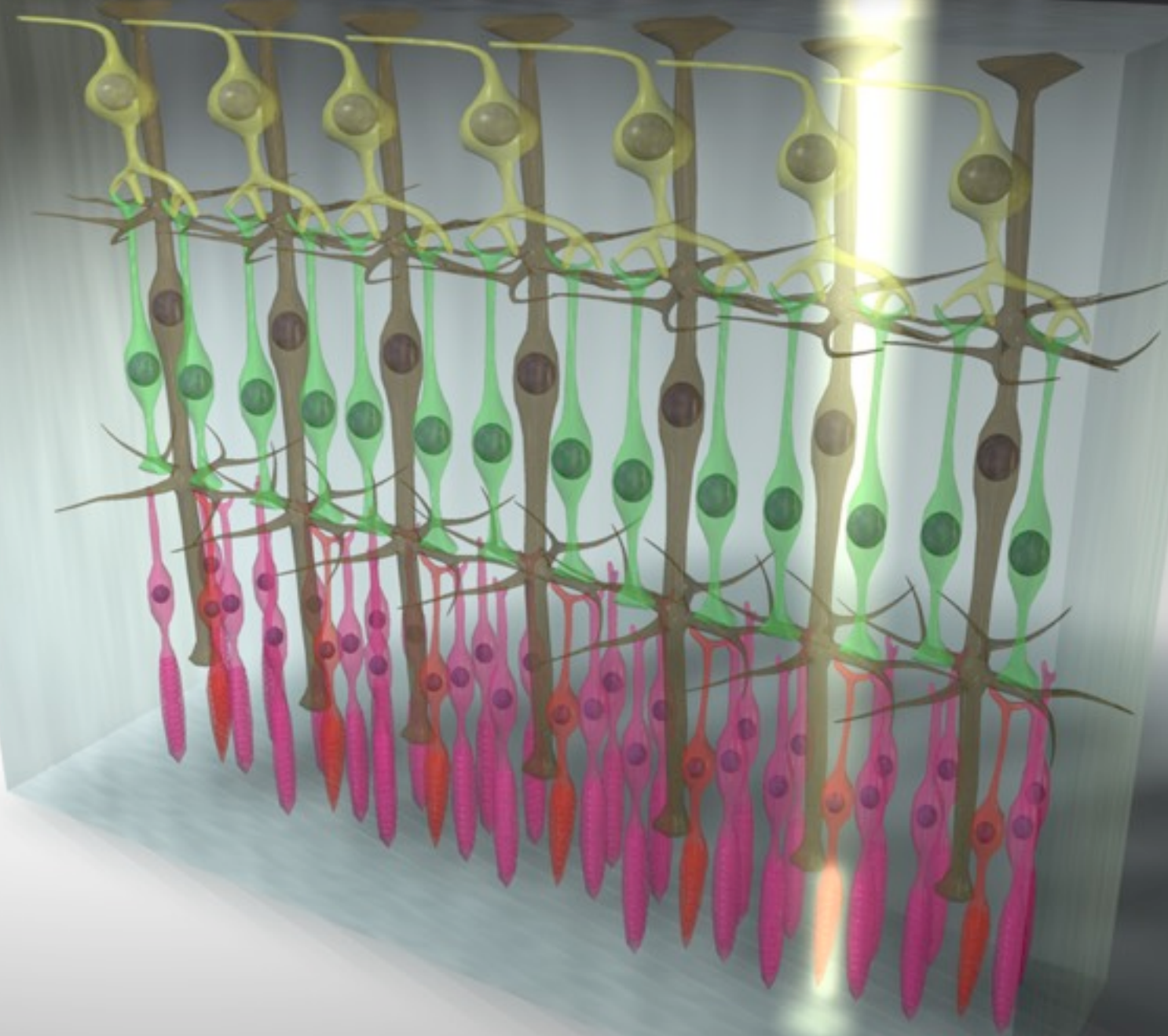


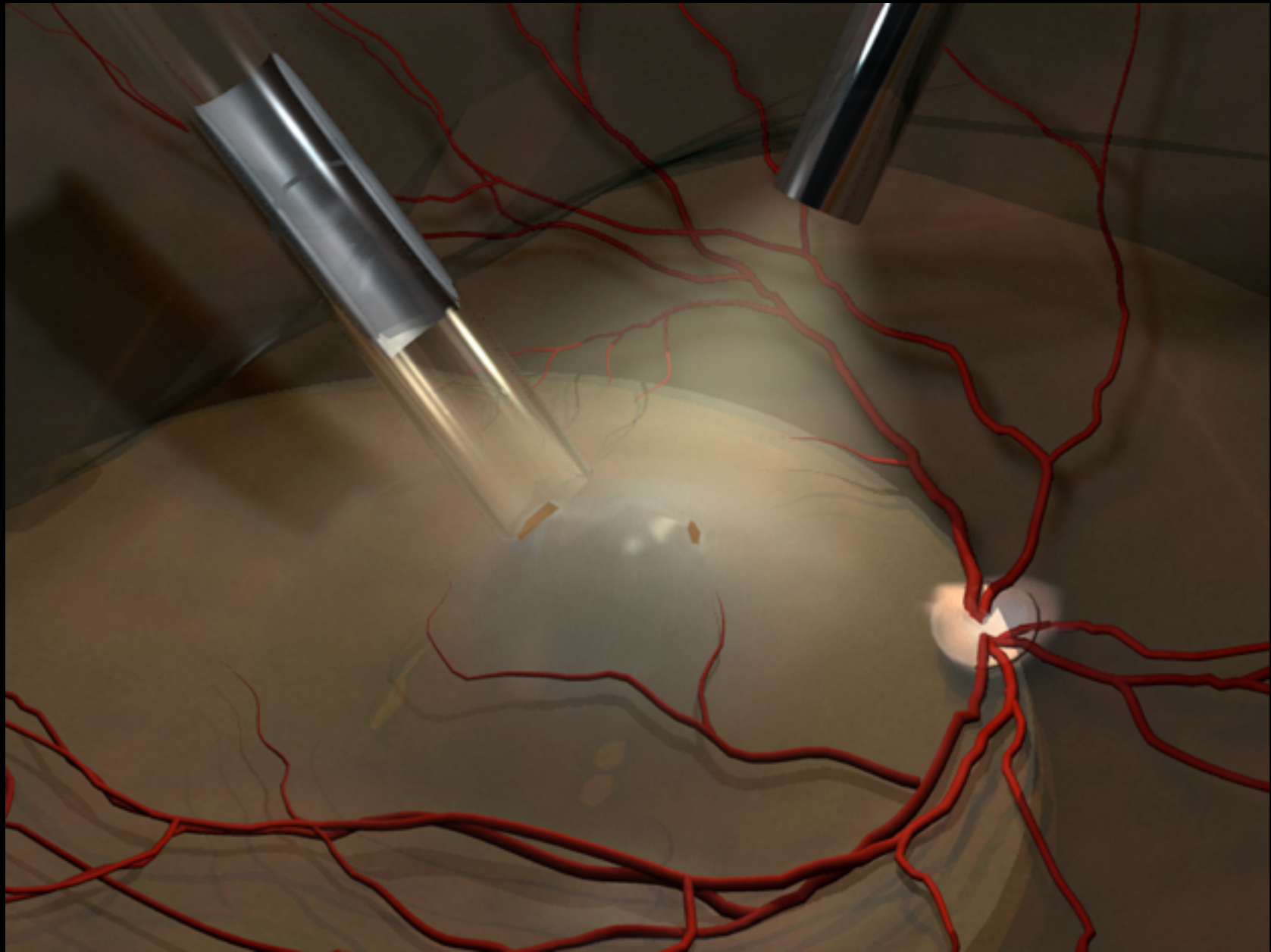
Summary

Retinal Biomechanics

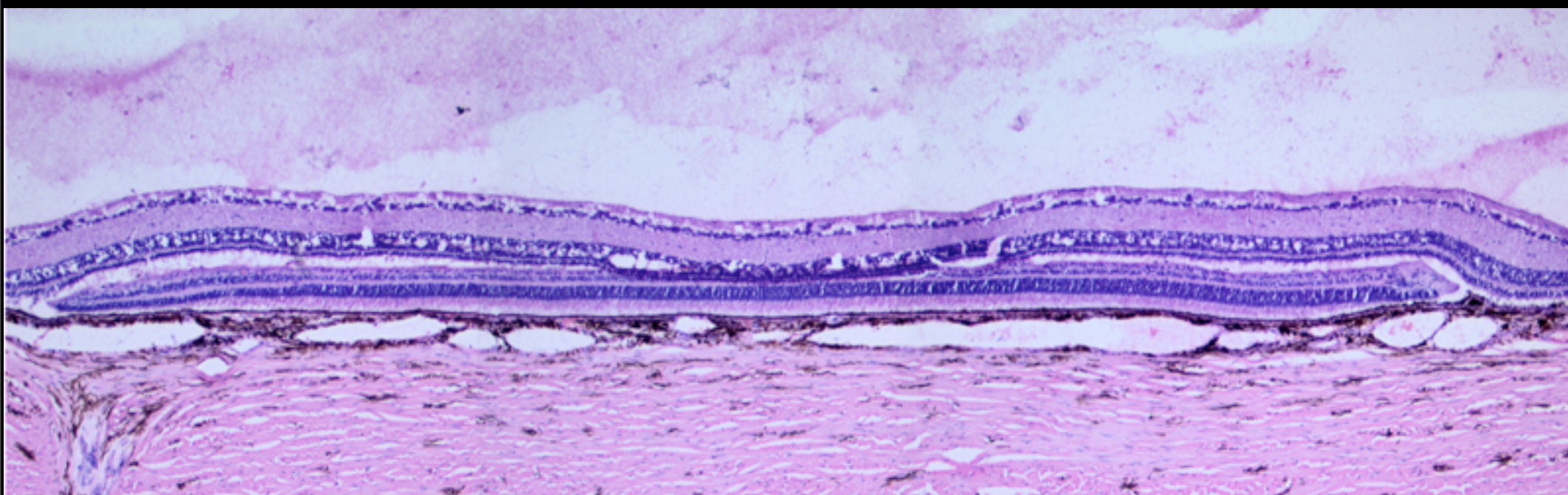
- The retina displays elastic behavior
- Tissue stretch/elasticity is important for retinal homeostasis
- Lack of stretch is detrimental to neuronal survival
- "Overstretch" harmful? Glaucoma
- Regulation - Pharmacological intervention?

II. HOW CAN WE REPLACE DEAD RETINAL NEURONS?

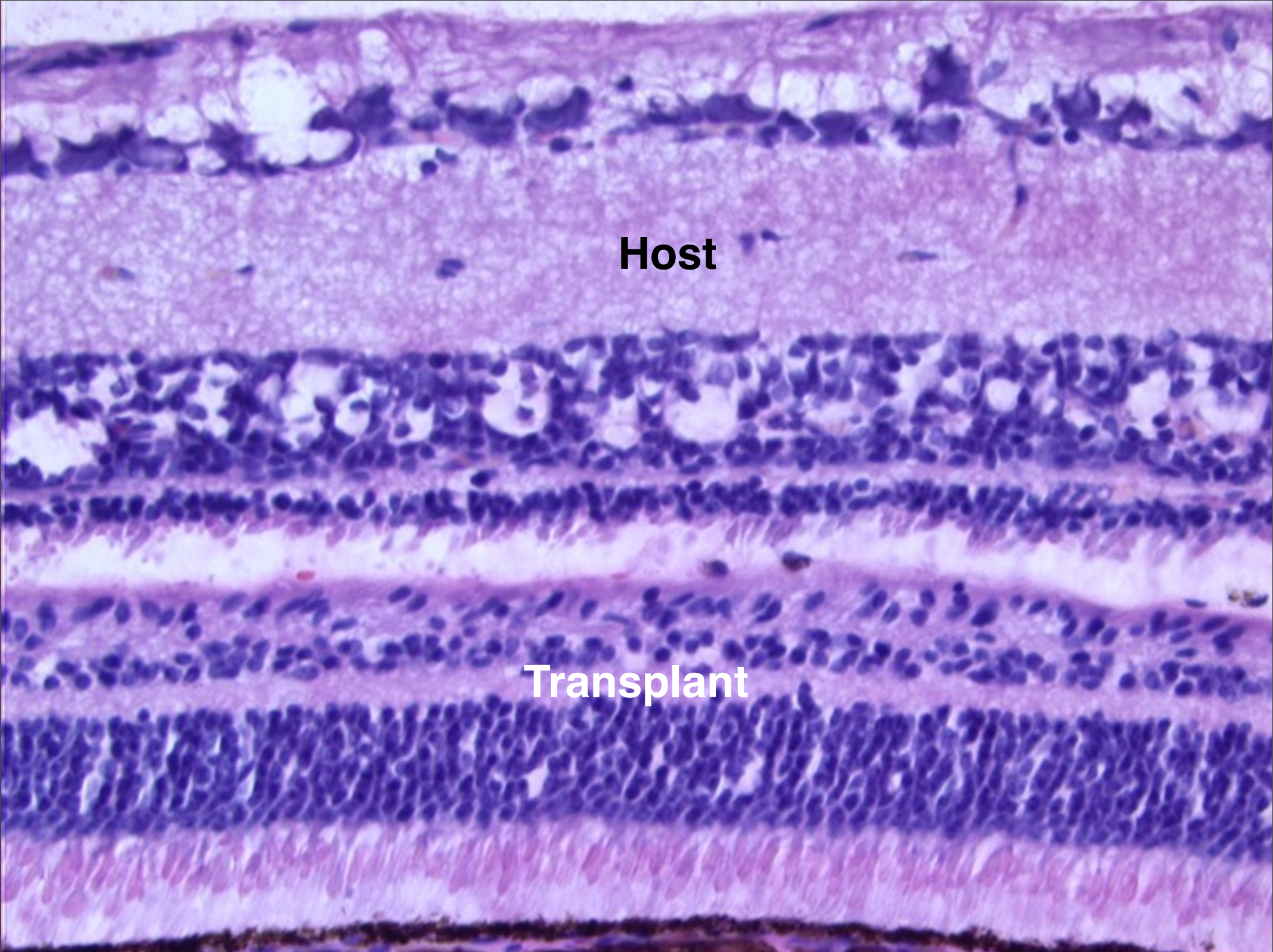




RETINAL TRANSPLANTATION

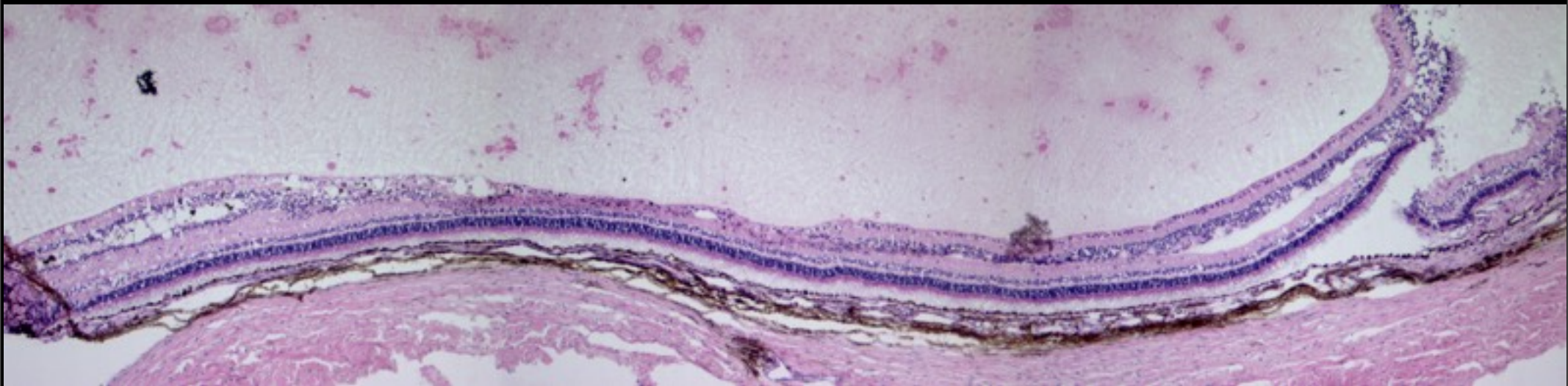


FETAL TRANSPLANT 4 MONTHS POSTOP (FIG)

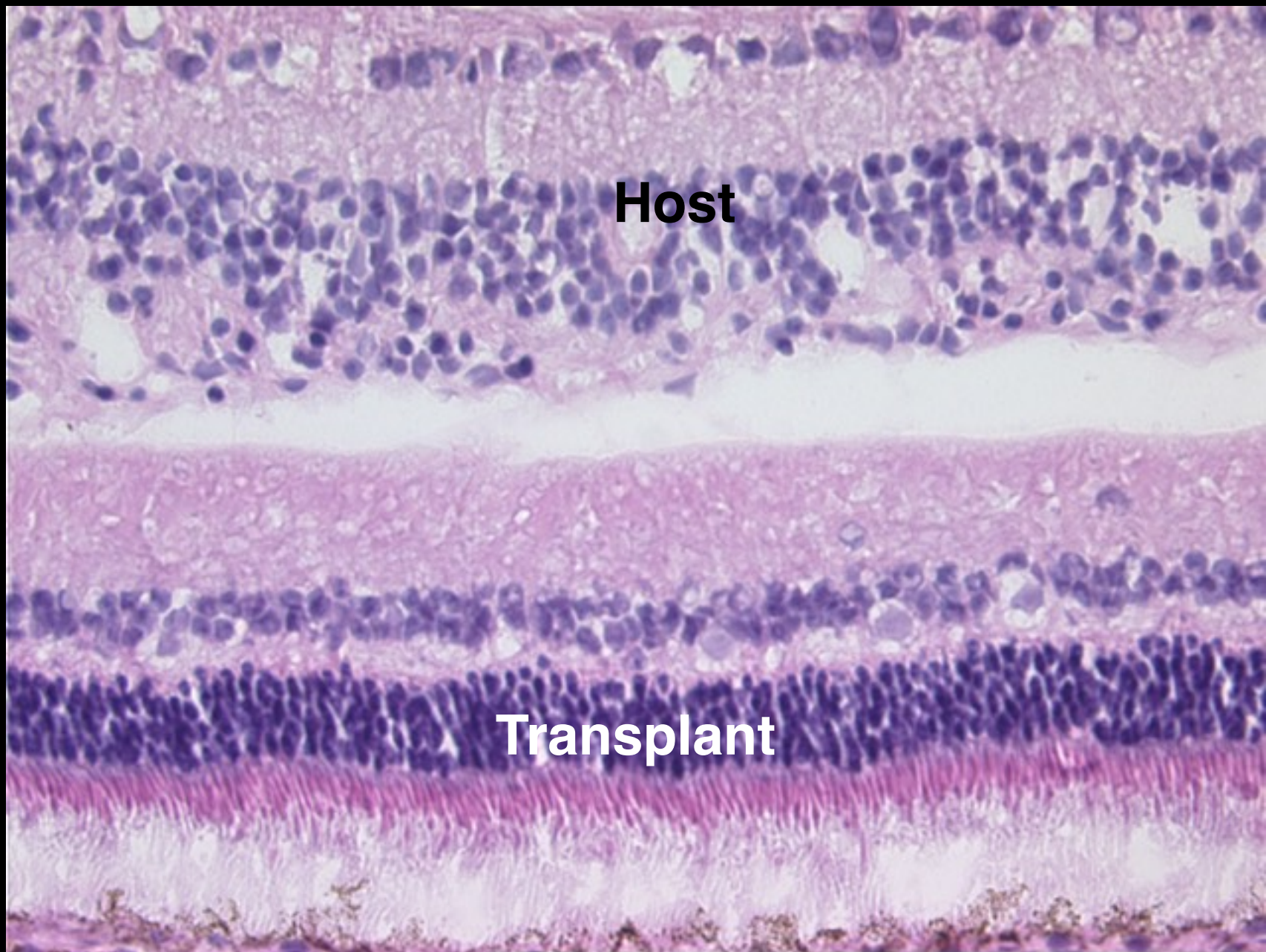


Host

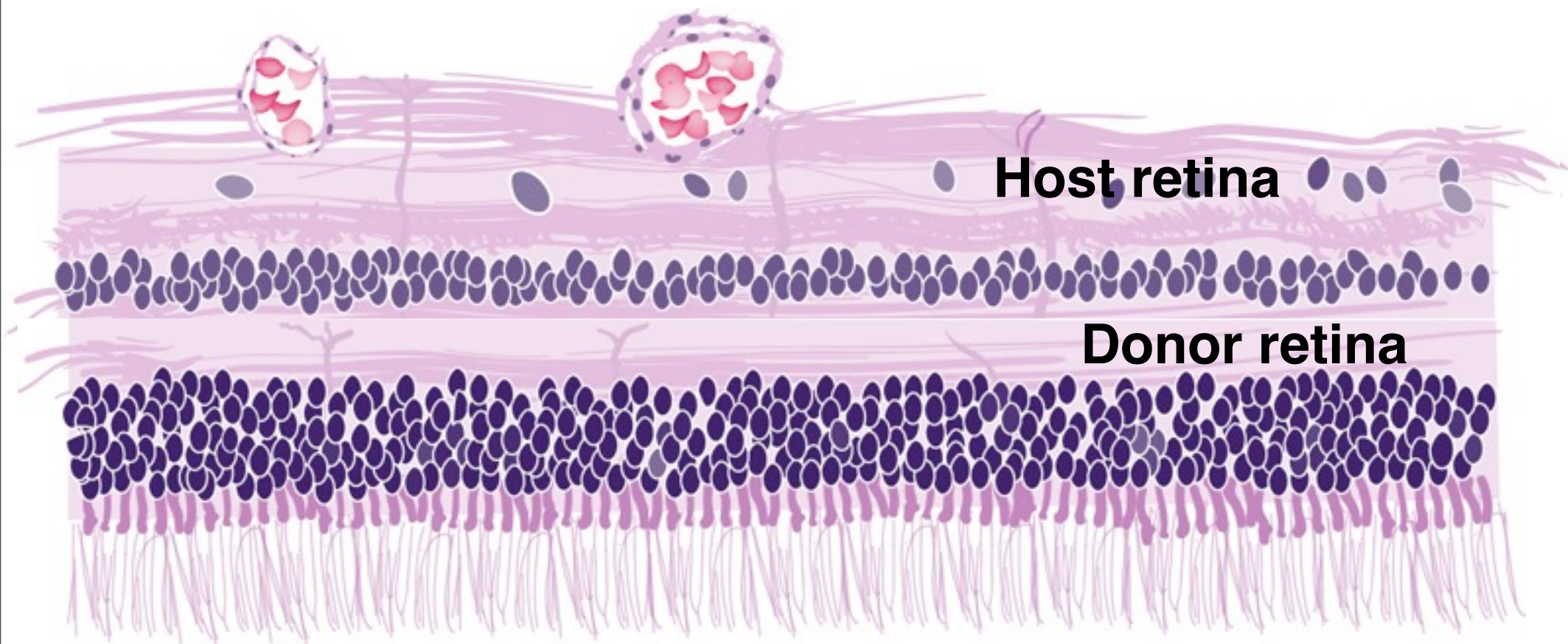
Transplant

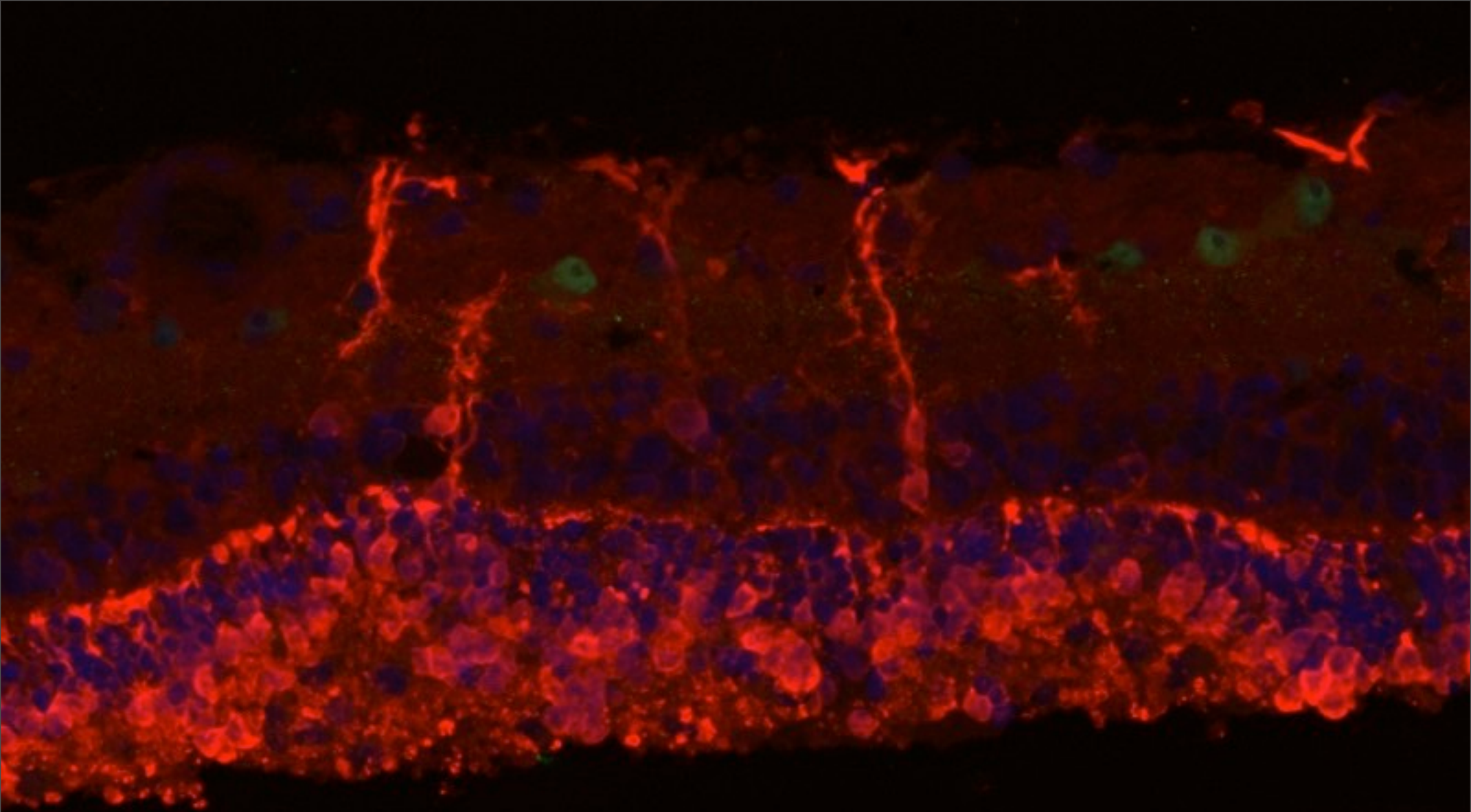


Adult Rabbit Transplant 6 months postop



**Adult Rabbit Transplant
6 months postop**



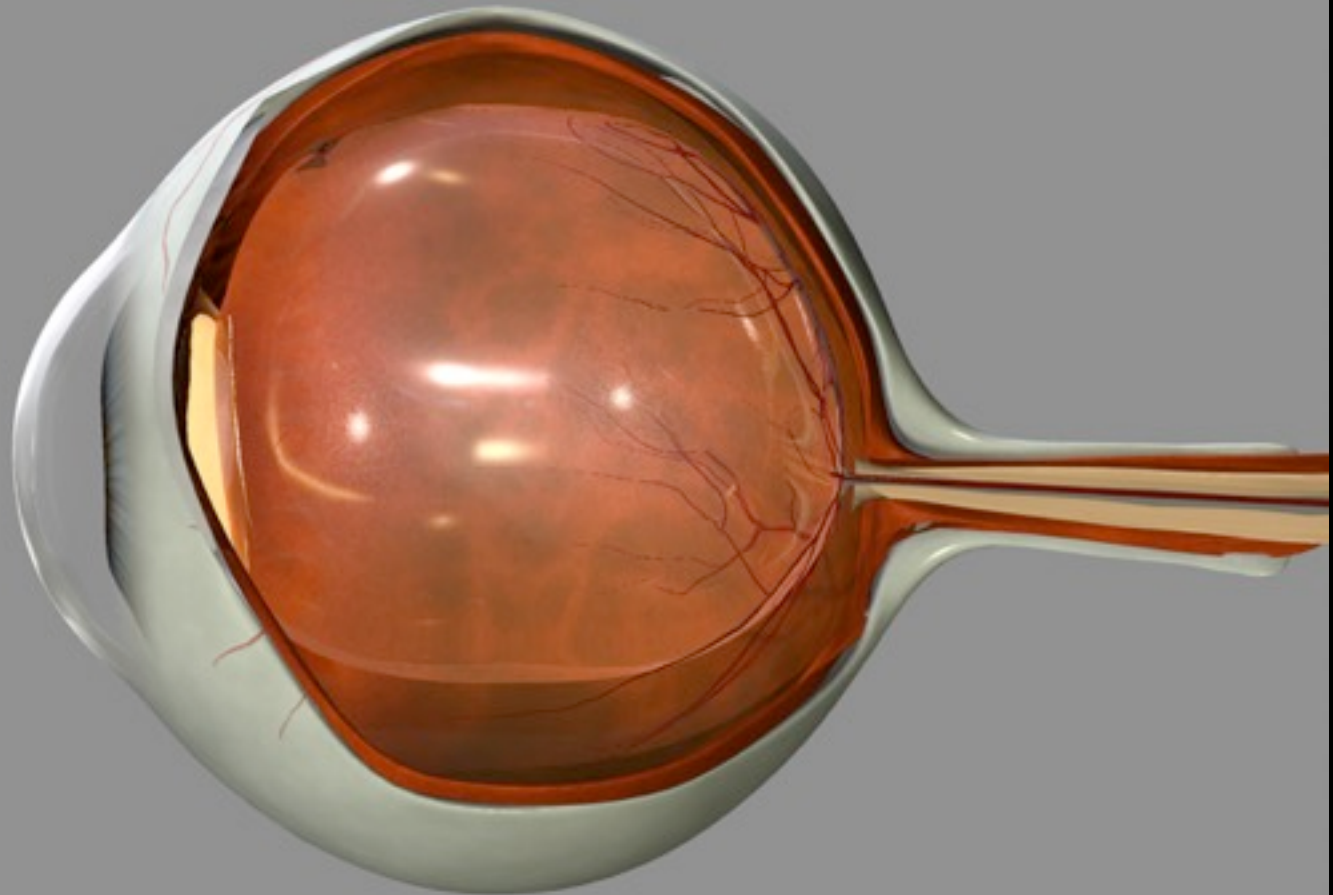


Adult Cultured Retina – DMSO

Summary - Transplantation

- Transplant survives long-term YES
- Transplant is well differentiated YES
- Transplant is well organized YES
- Transplanted neurons connect with host ???

III. VITREOUS SUBSTITUTION

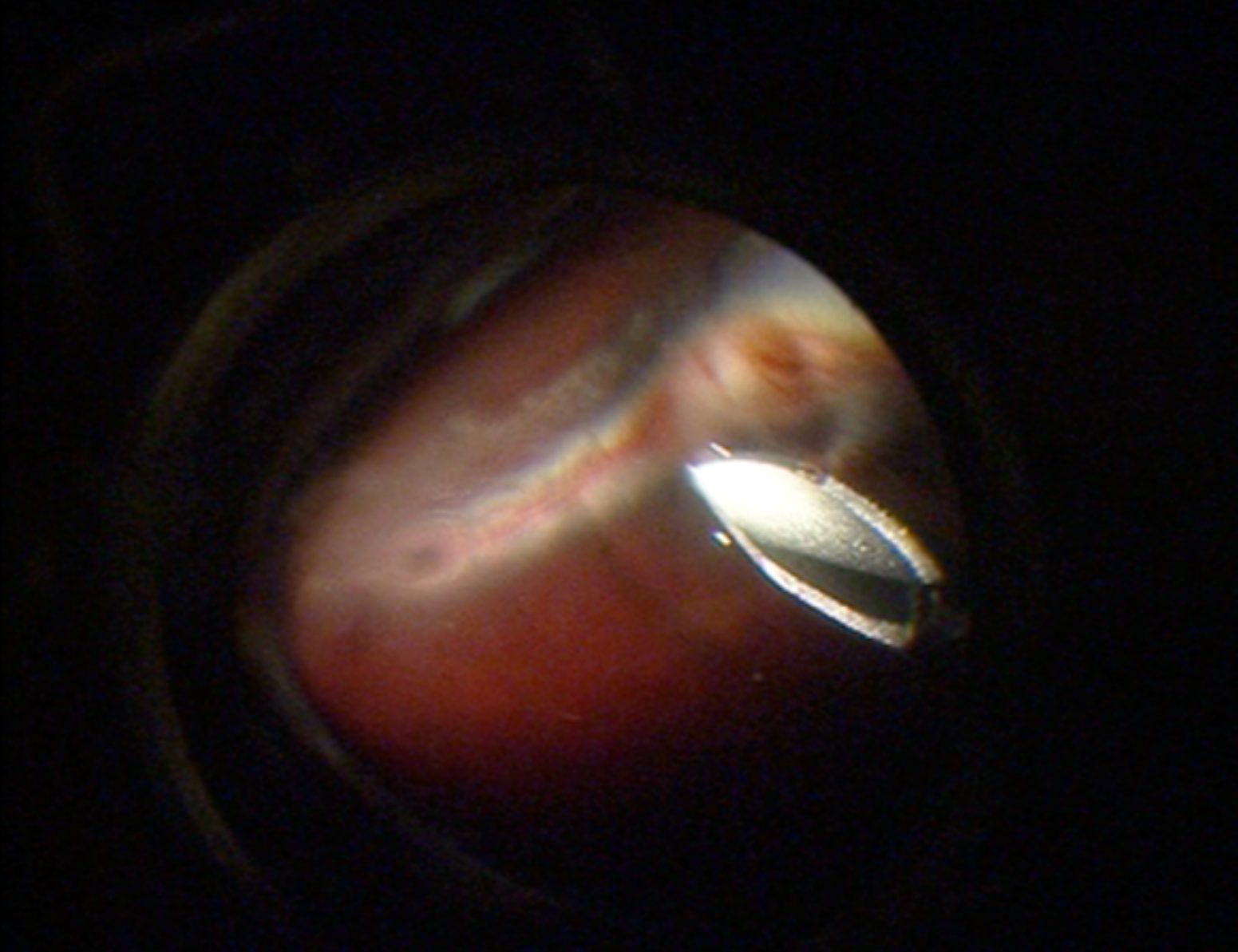


The background of the slide is a circular, close-up view of a vitreous body, likely from a mouse eye, showing a gel-like structure with some internal reflections and a surgical instrument (a needle or cannula) visible on the left side, pointing towards the center. The text is overlaid on this image.

LUND/ÖREBRO EXPERIMENTAL MODEL FOR VITREOUS REPLACEMENT

- Vitrectomy + Gel injection
- IOP + ERG
- Morphology 1 month postop

POLYMER GEL INJEKTION

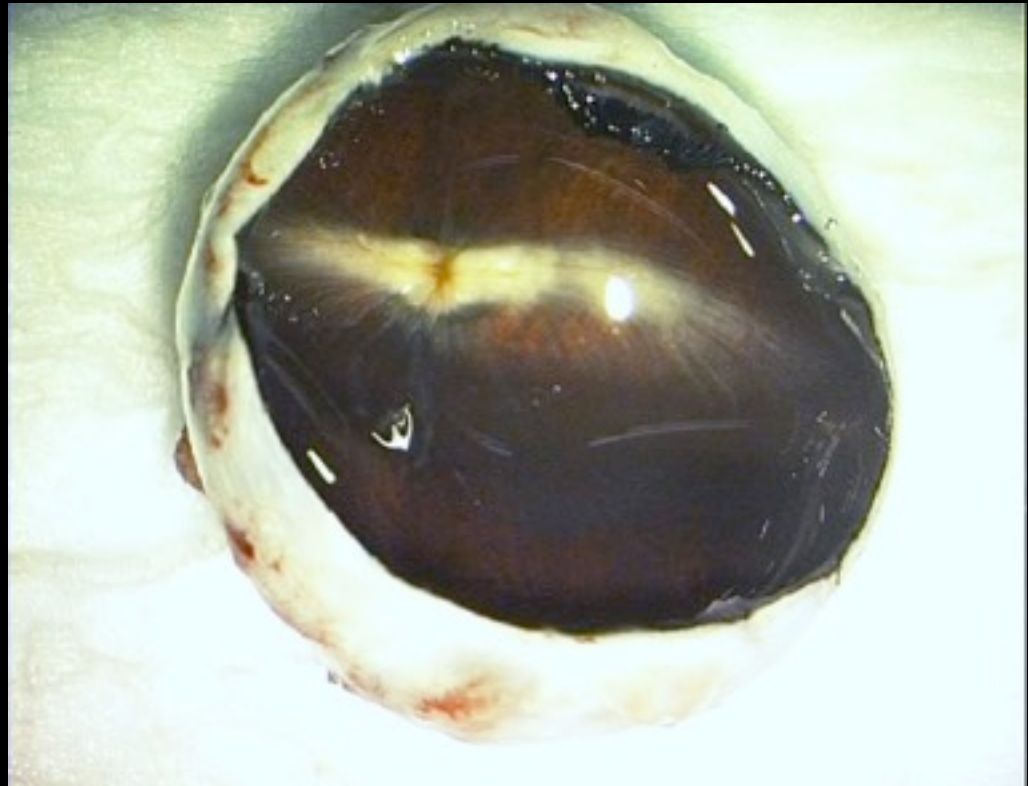


PEG



6 DAYS POSTOP

1 MONTH POSTOP



ERG

Pre operative

Post operative

Post operative

Darkadapted

Rod response

Blue light

Combined response

30 Hz flicker responses

Lightadapted

50 μ V
20 ms

5 μ V
10 ms

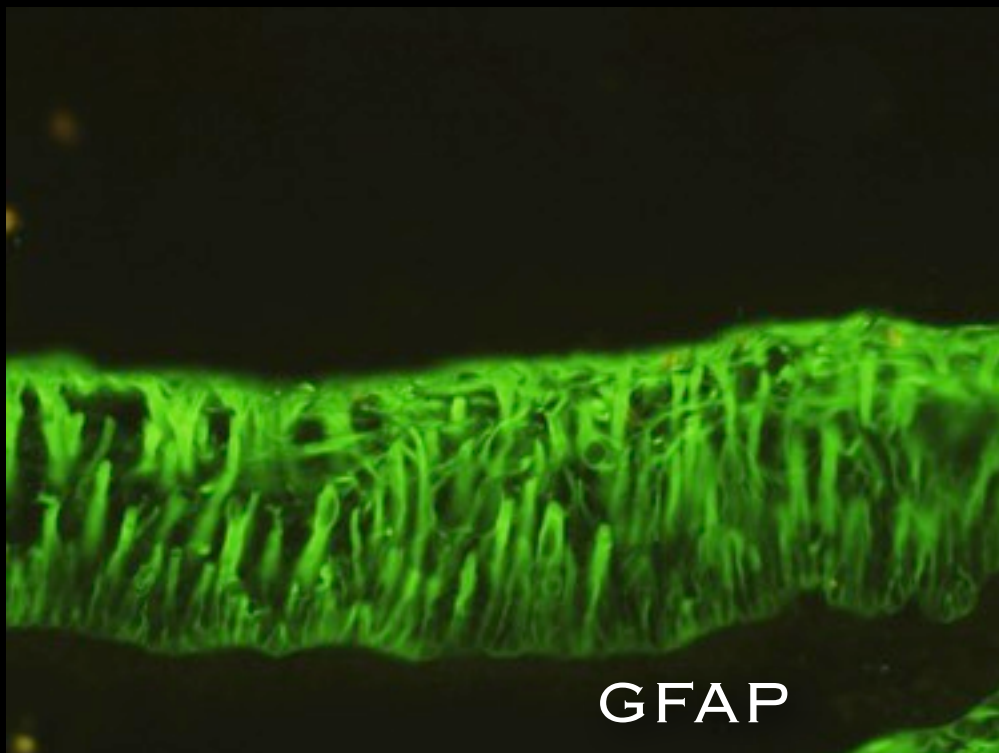
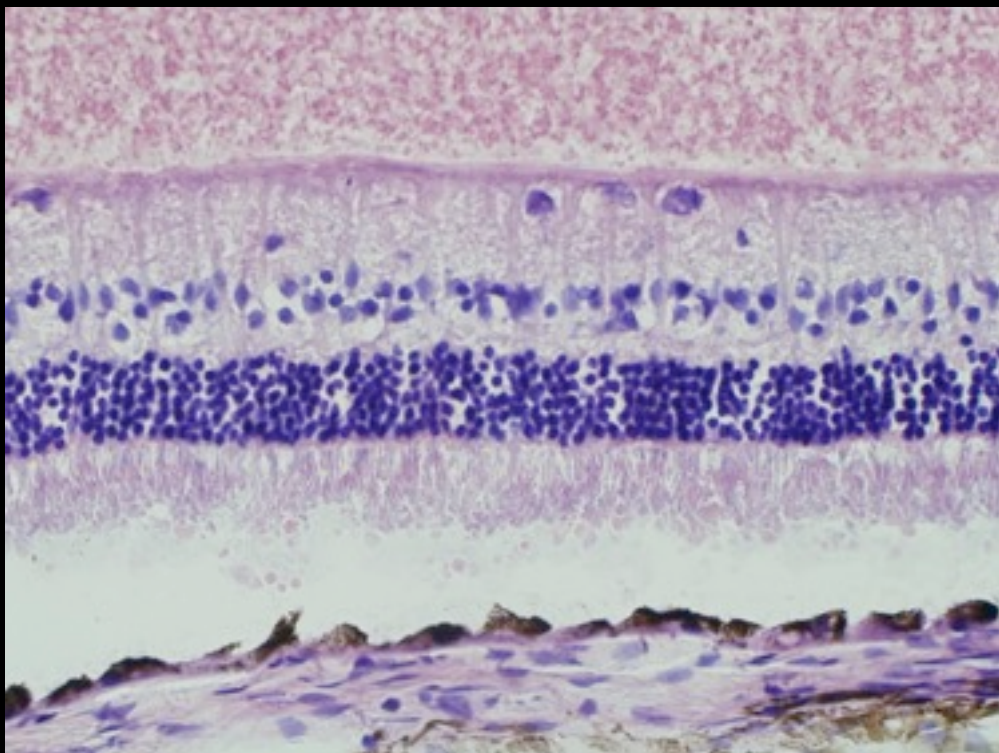
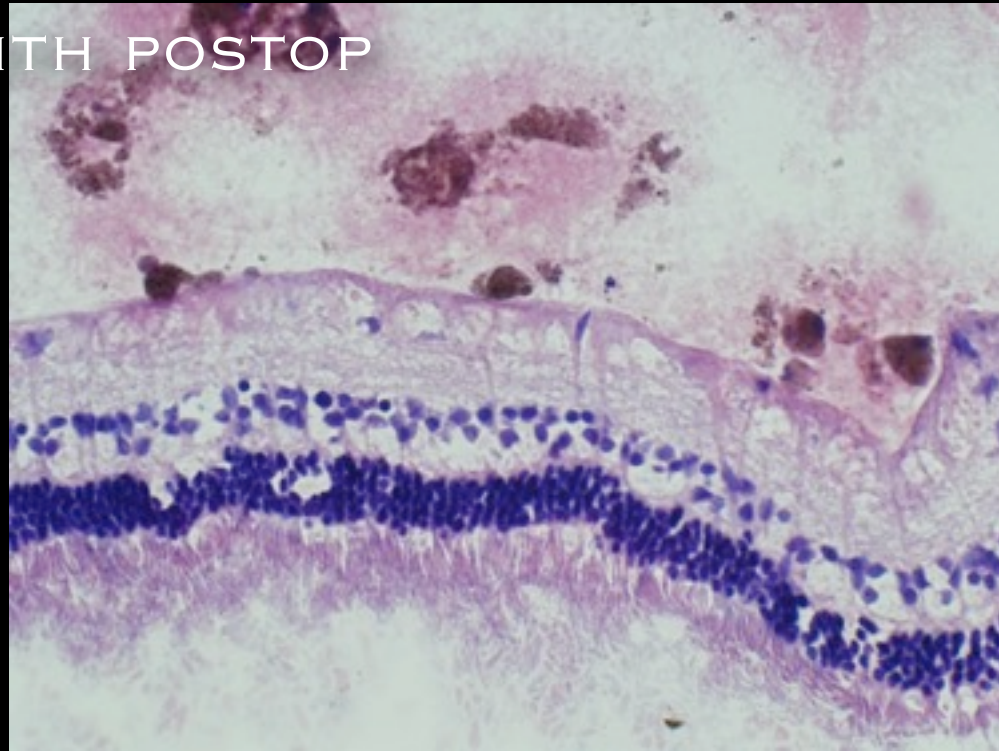
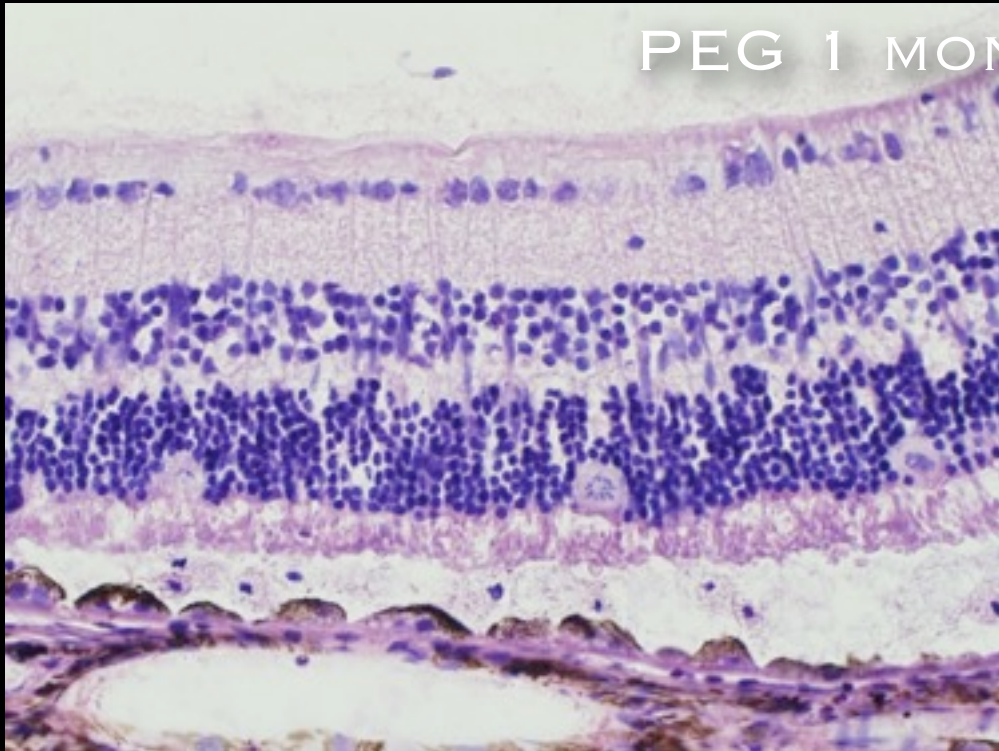
50 μ V
20 ms

10 μ V
10 ms

BIO-ALCAMID

PEG

PEG 1 MONTH POSTOP



GFAP

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Fredrik Ghosh

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