Posterior Capsule Opacification

A STUDY

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Just a brief list of things I will be going over in my presentation to hopefully not bore you out!

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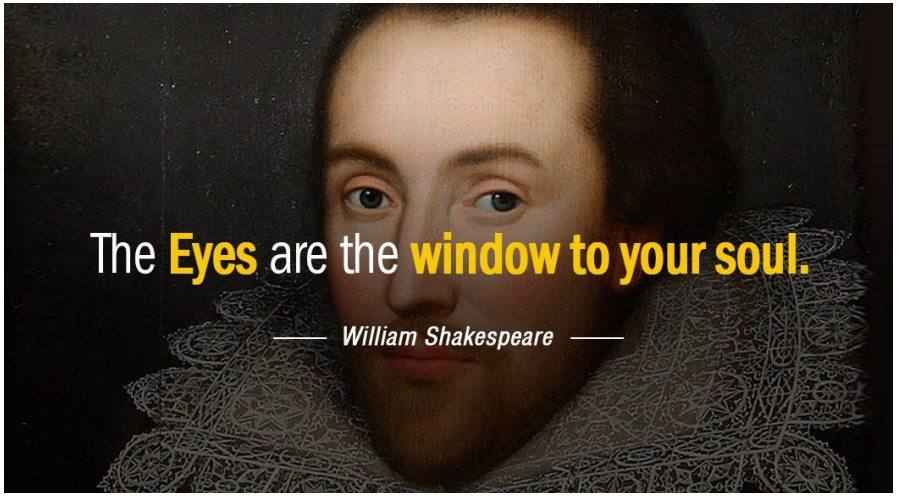
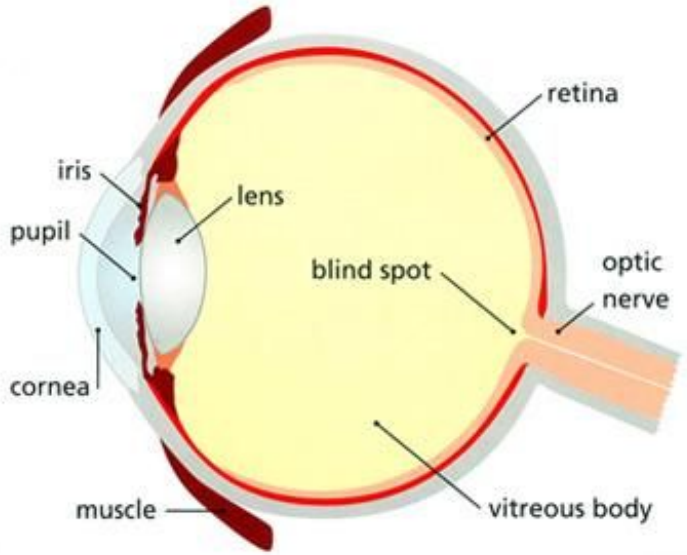
BACKGROUND

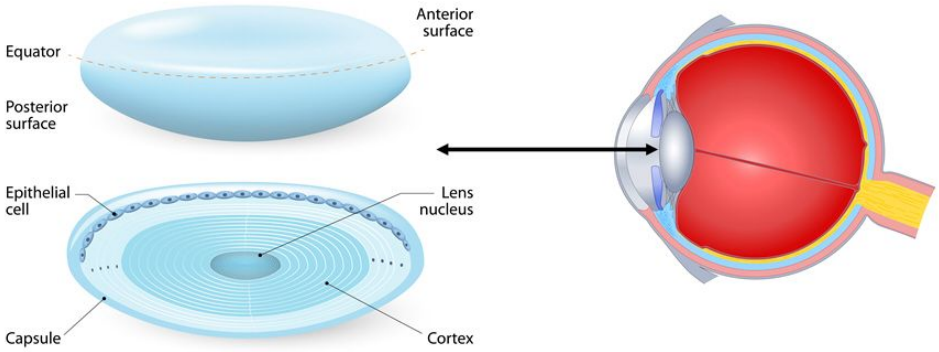
- Our eyes serve as a window to the world we live in.

- Grants us the ability to communicate and appreciate just by capturing light.

- Fundamental aspect of our existence, shaping our interactions, experiences, and understanding of the world.







Basics of Vision

Main Focus: Lens and Retina

Cornea: Protection

Iris: Light Control

Lens:

- Lens Cortex: holds lens fiber cells
  - Crystallin: Protein
- Epithelial Cells: elongate into fiber cells

Retina:

- Senses light and sends signals to your brain

CATARACT

- What is it?

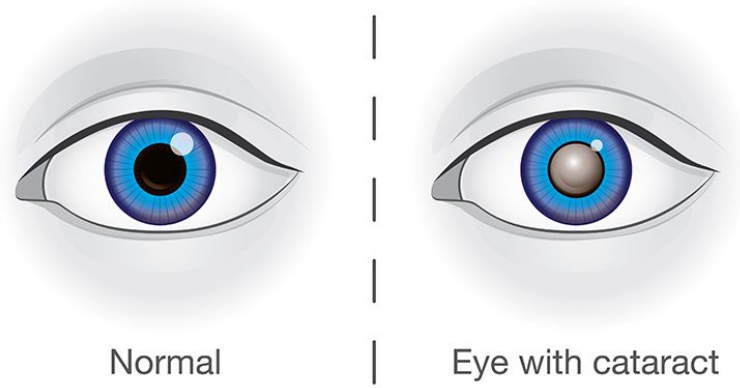
  -Lens becomes opaque because crystallin not doing its job properly anymore

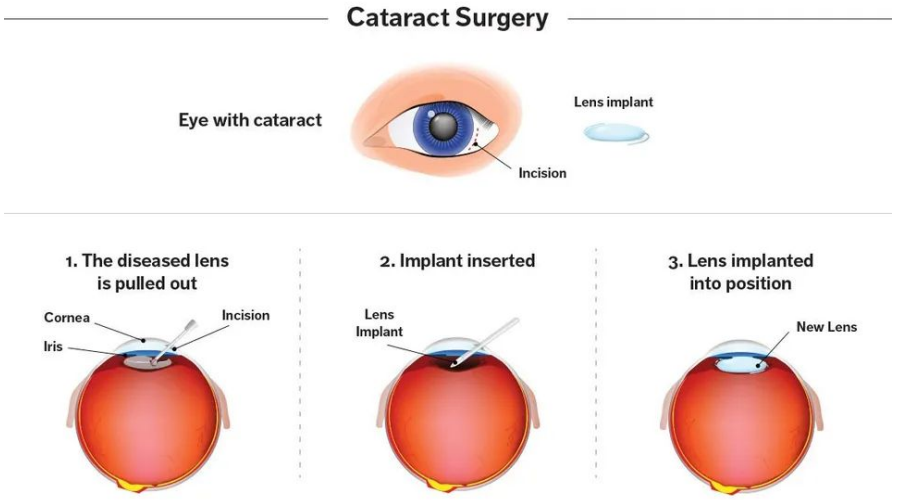
- What is Cataract Surgery?

  -Incision performed on the cornea to replace lens within an acrylic lens (IOL)

- Potential Issues/Side effects?

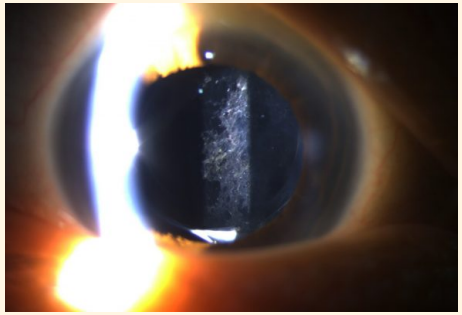
  -Remaining epithelial cells that is hidden from surgeon’s point of view





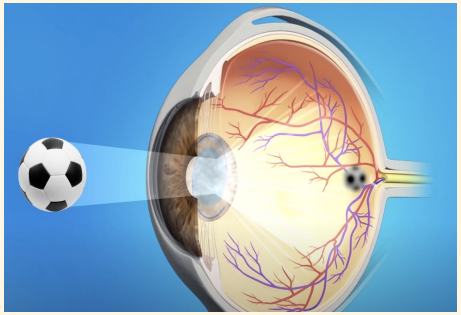
POST CATARACT

- Remaining epithelial cells are the main cause of Posterior Capsule Opacification (PCO)



Chain Reaction

Epithelial cells transition into mesenchymal cells which are capable of migration towards the back. Since there is no longer a clear path for light to travel through it



Clouded Images

(also referred to as a secondary cataract)

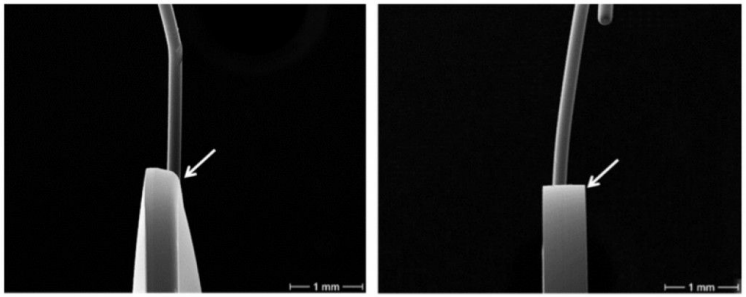


Figure 6: Scanning electron photomicrographs of two types of 3-piece hydrophobic acrylic IOLs. The arrows show the anterior optic edge of the lenses. A) Round edge. B) Square edge.

TREATMENT THEORY

There are measures that can be taken to resolve issues that arise from PCO. However, with the amount of potential issues that can arise, preventative measures have been currently researched.

01 Laser Ablation

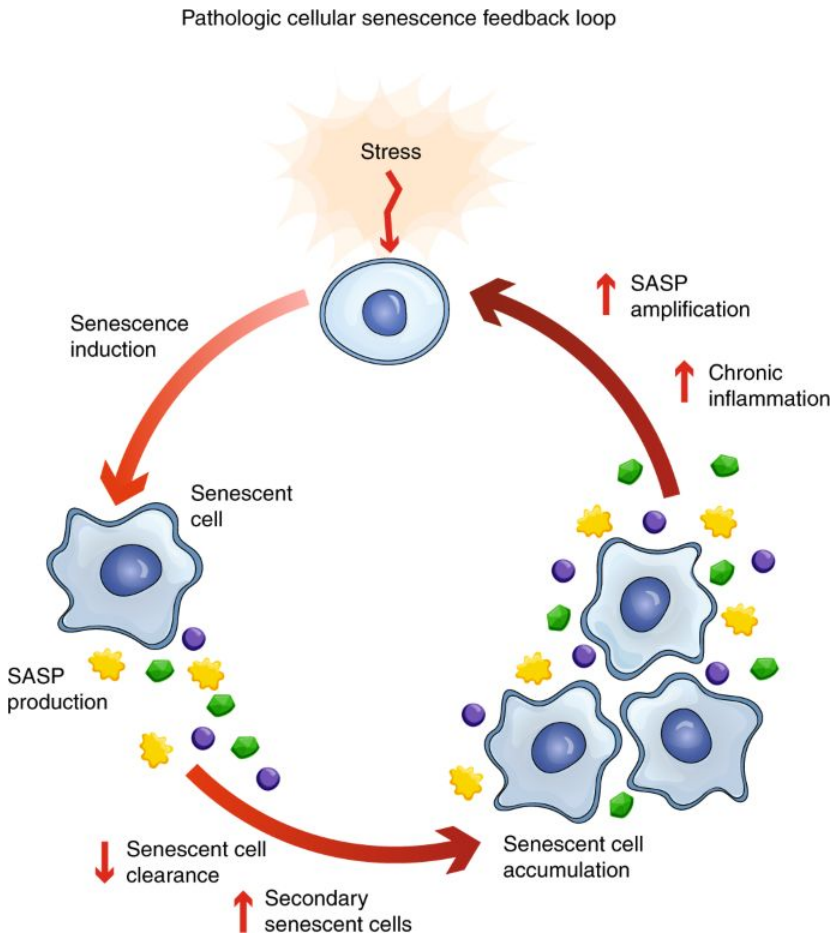
- Allows light to pass through to the retina
- Comes with a lot of potential side effects:
  - Could lead to IOL Displacement
  - Can Increase Inocular Pressure
  - Retina Displacement

02 IOL Design

- Square edge IOL
  - Acts as a barrier to prevent cell migration

03 Therapeutic Intervention

- Senotherapy: targets senescence
- To prevent the issue from developing rather than fixing it once it's already occured
- **Resveratrol (RESV)**
  - prevent epithelial cells from becoming senescence



THEORY **BACKGROUND**

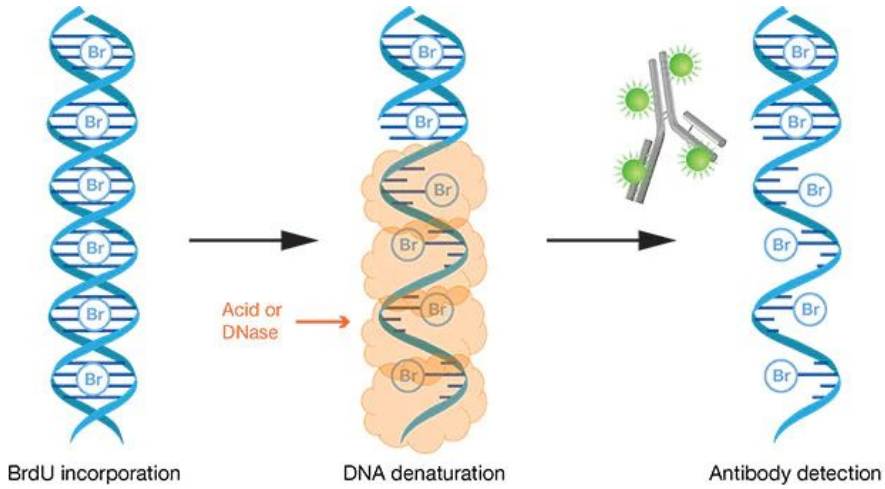
- All cells within the body are capable of becoming senescence cells.
- **Hypothesis:** Components of the capsule bag and the body's response to the cataract surgery results in a trigger that causes epithelial cells to turn into senescence cells
- Senescence cells releases cytokines and growth factors that can trigger Epithelial Mesenchymal Transition (EMT) in neighboring cells

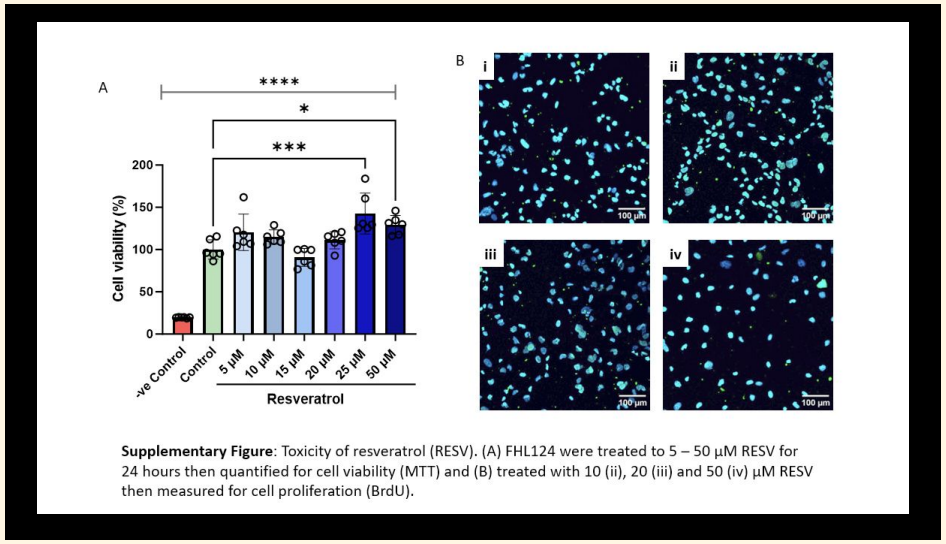
EXPERIMENTATION

- Preliminary Toxicology Experiments
  - Ensures that the treatment isn't harmful to surrounding cells
  - Check for proliferation because all cells naturally proliferate

- Cell Culture: MTT
  - Used to check for cell viability

- Cell Culture: BrdU
  - Used to check for proliferation





Supplementary Figure: Toxicity of resveratrol (RESV). (A) FHL124 were treated to 5 – 50 µM RESV for 24 hours then quantified for cell viability (MTT) and (B) treated with 10 (ii), 20 (iii) and 50 (iv) µM RESV then measured for cell proliferation (BrdU).

RECAP

- Blue Dots:

  - DAPI

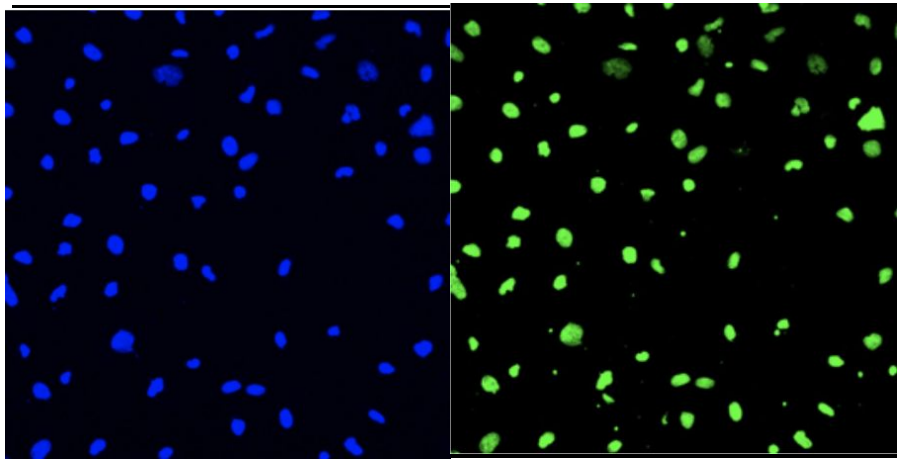
  - Nucleus: Cell Viability
- Green Dots:

  -BrdU

  -Proliferation: separating
- Turquoise Dots:

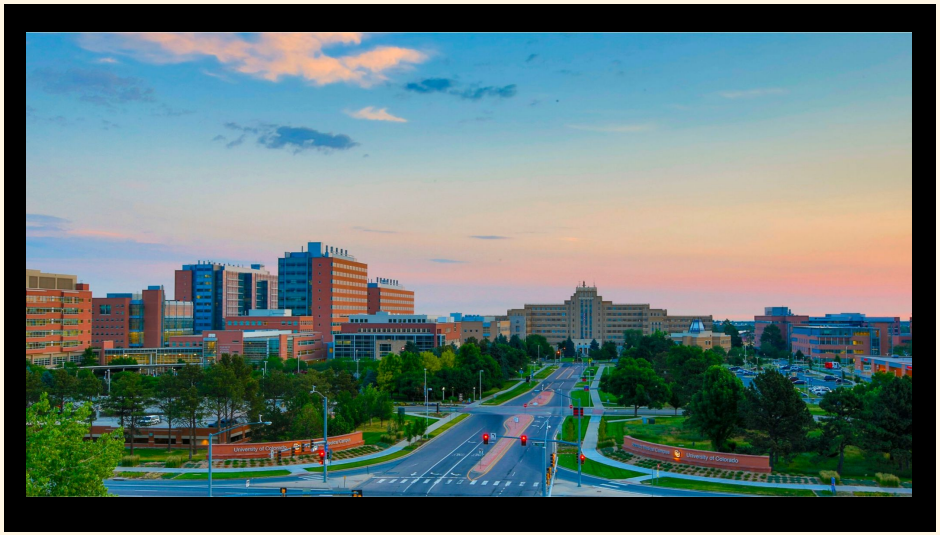
  -Combination of green and blue

  -Indicates that the live cells are also proliferating



EXPERIENCE

- Exposure to different studies of the eye
- Opportunities for further exploration of the field
- Learn more about techniques and equipment used in the lab
- Flexible and an overall valuable experience



THANKS FOR LISTENING