

Latest Advances in Cataract Surgery

Samuel Long, MD
Boulder Eye Surgeons
303-625-6451

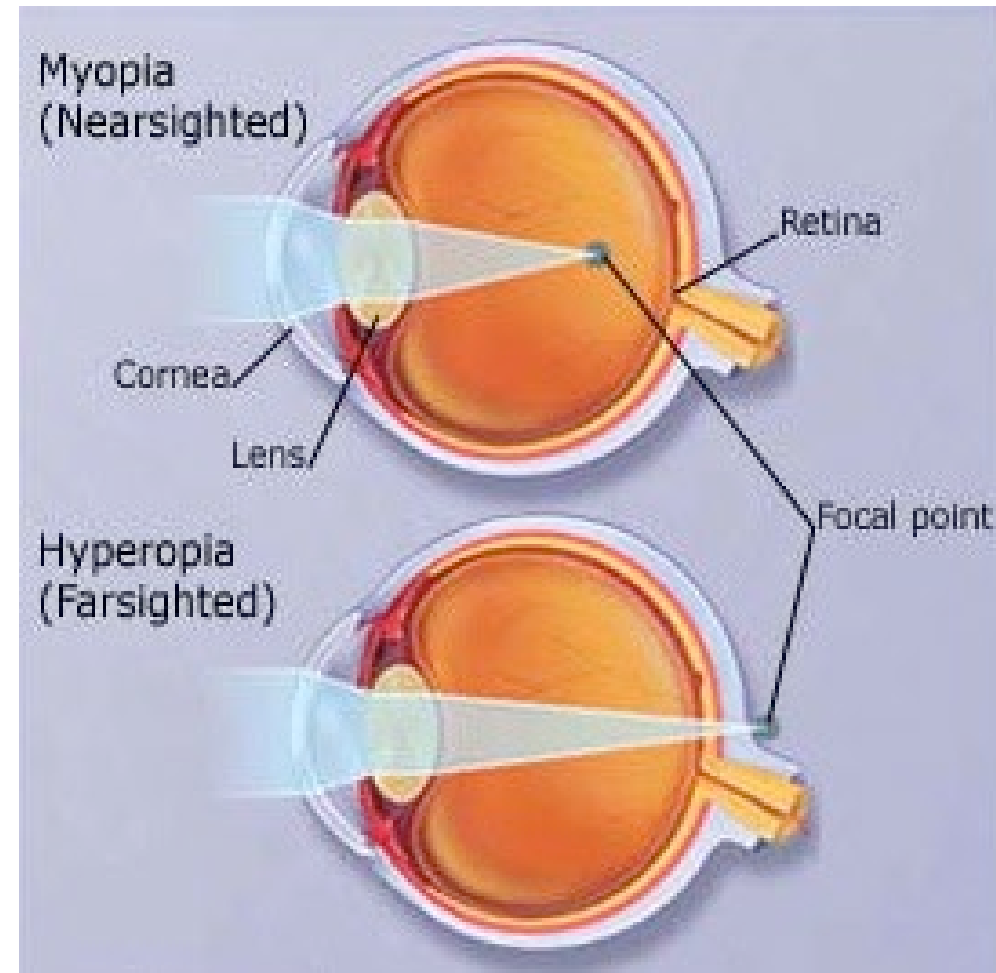
Ocular Anatomy



Near and Farsightedness

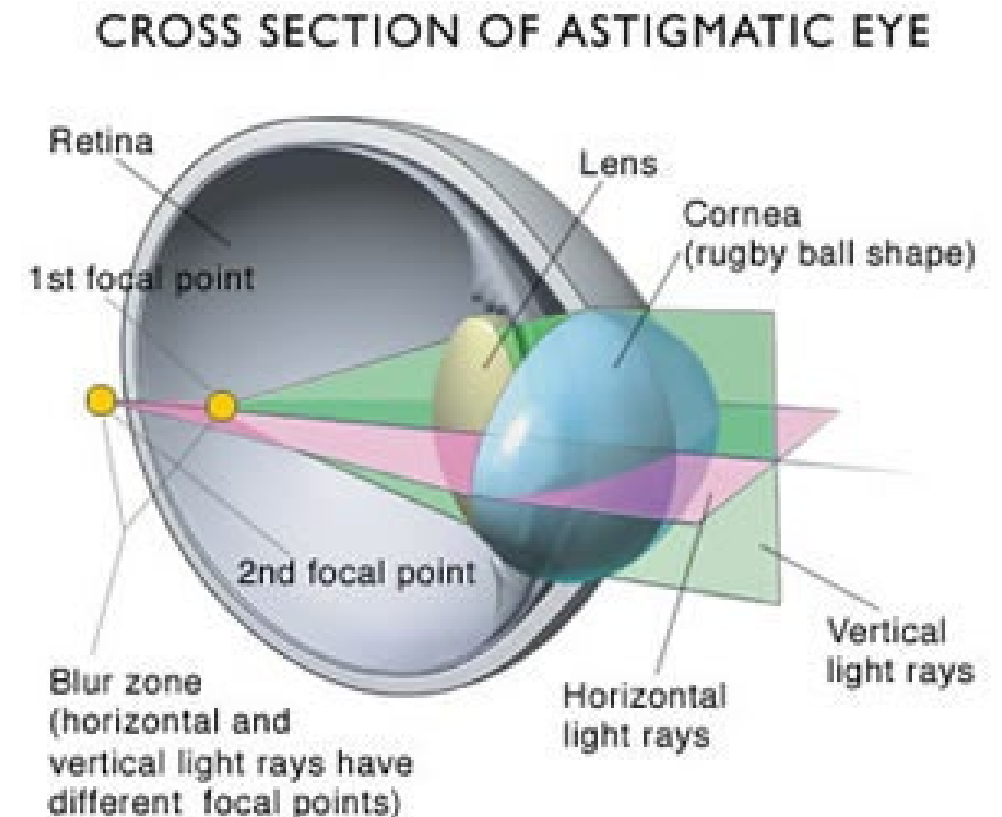
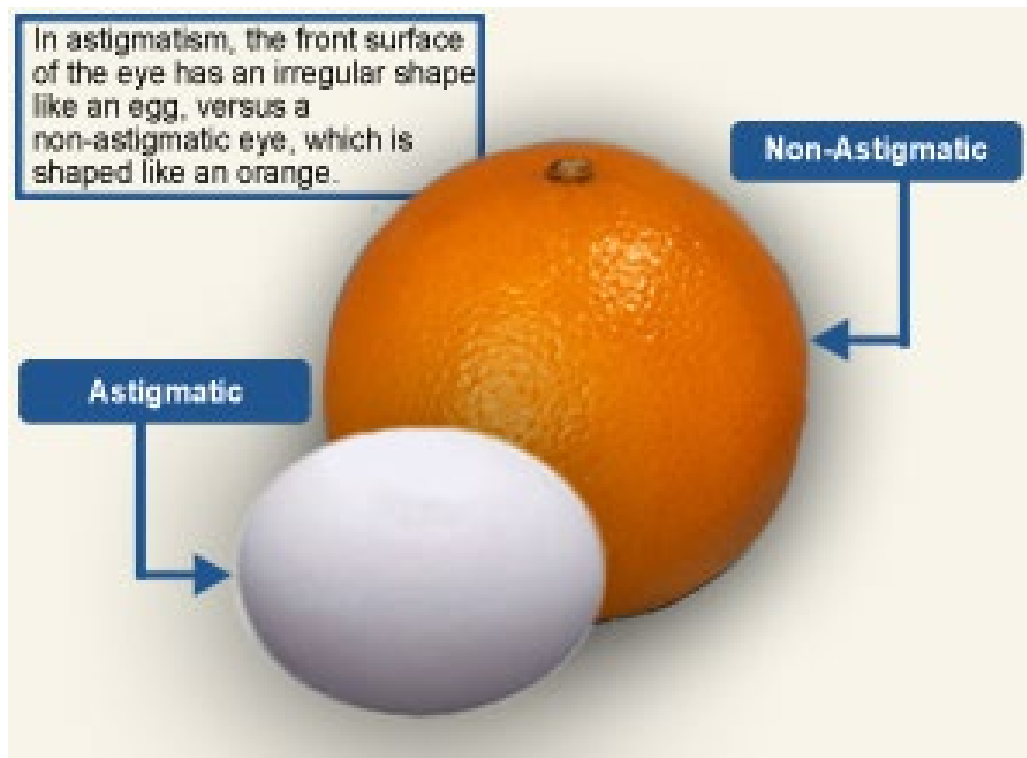
The Nearsighted Eye – the cornea and lens are too curved and/or the eye is too long.

The Farsighted Eye – the cornea and lens are too flat and/or the eye is too short.

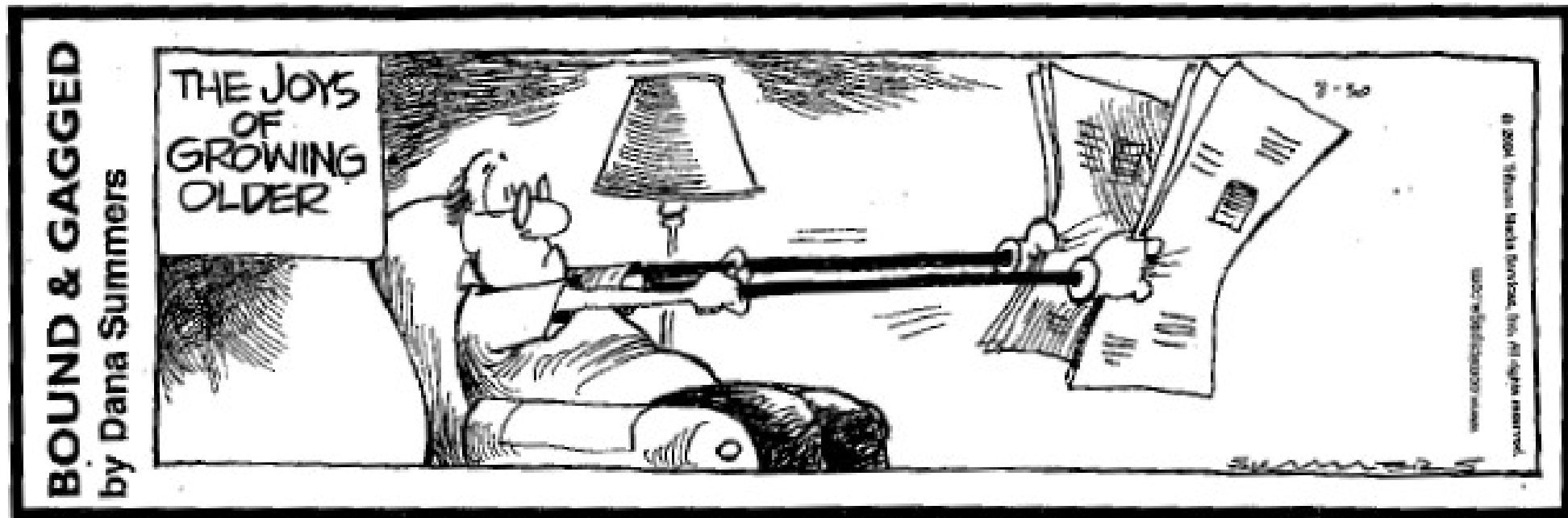


Astigmatism

- “out of roundness” of the eye
 - Usually from the cornea
 - Blurs vision at both far and near

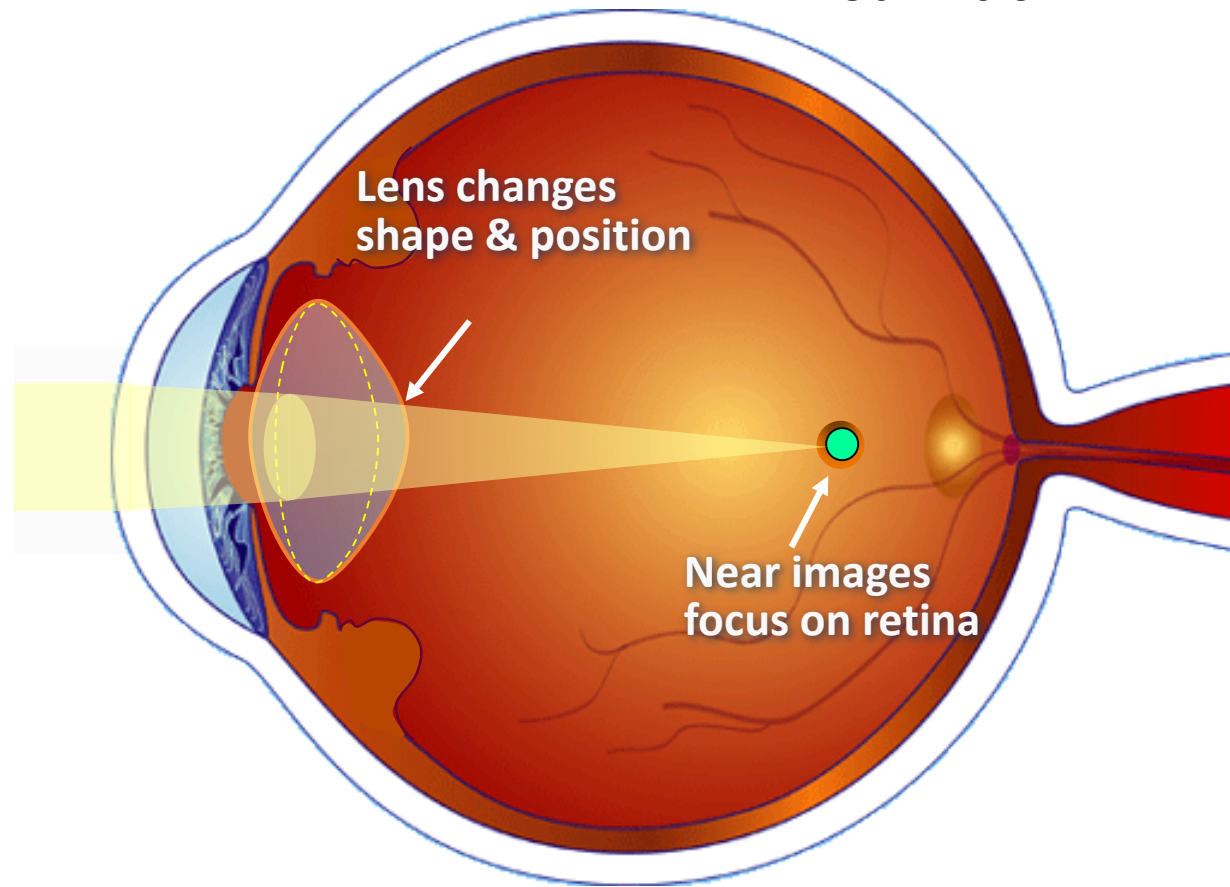


The automatic adjustment of the eye for seeing at different distances effected chiefly through changes in the position and convexity of the crystalline lens.



Normal Accommodation

Near Vision



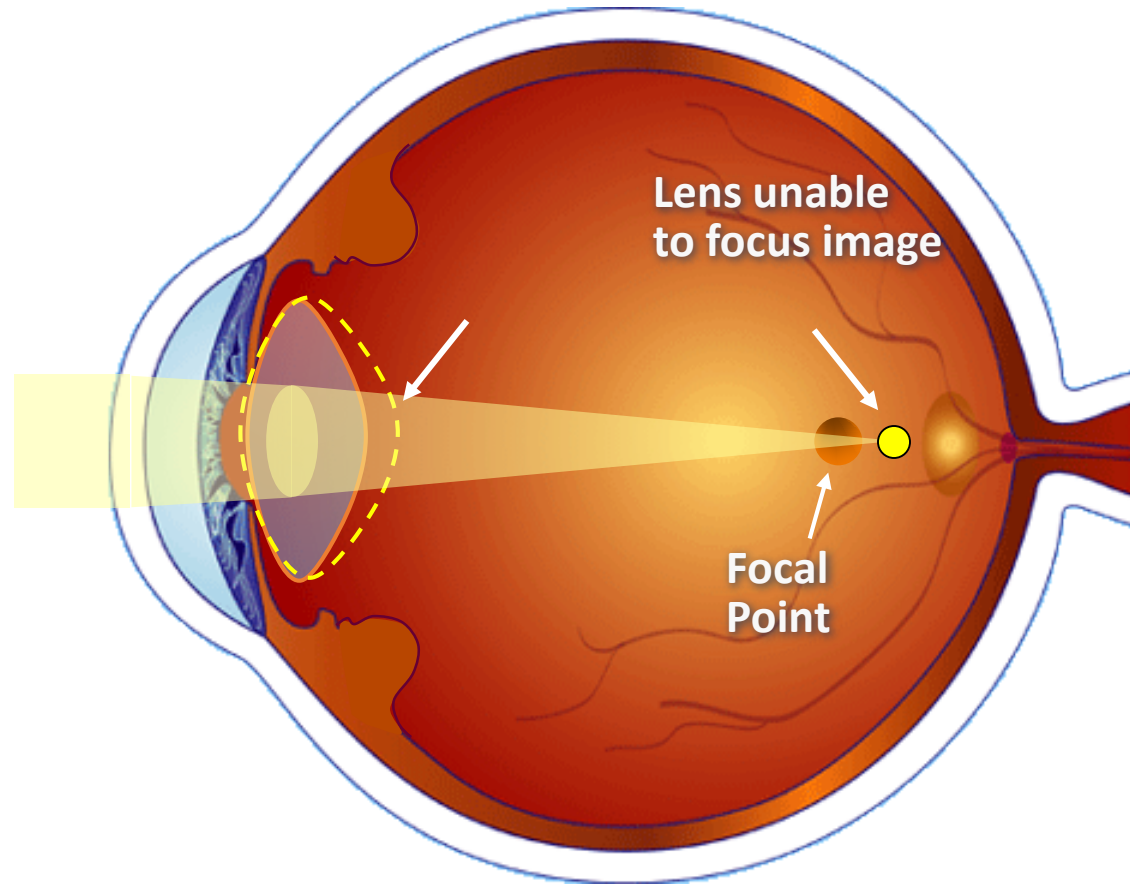
**Near vision is clear.
Distance vision out
of focus.**



When looking at near objects, the lens continues to change shape & move forward to focus image.

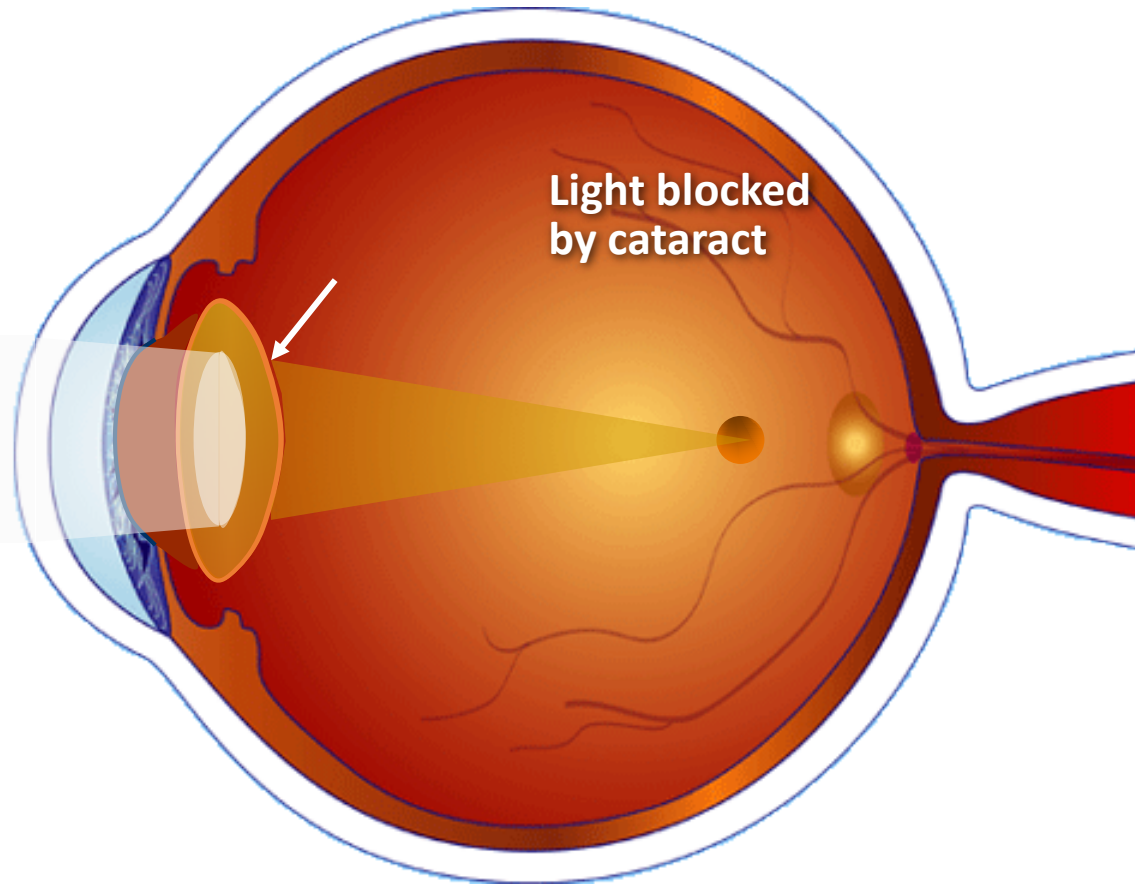
The Aging Eye

Near Vision



The aging lens loses its ability to change shape.
Reading glasses or bifocals are required.
Loss of Accommodation is called **PRESBYOPIA**.

Cataracts

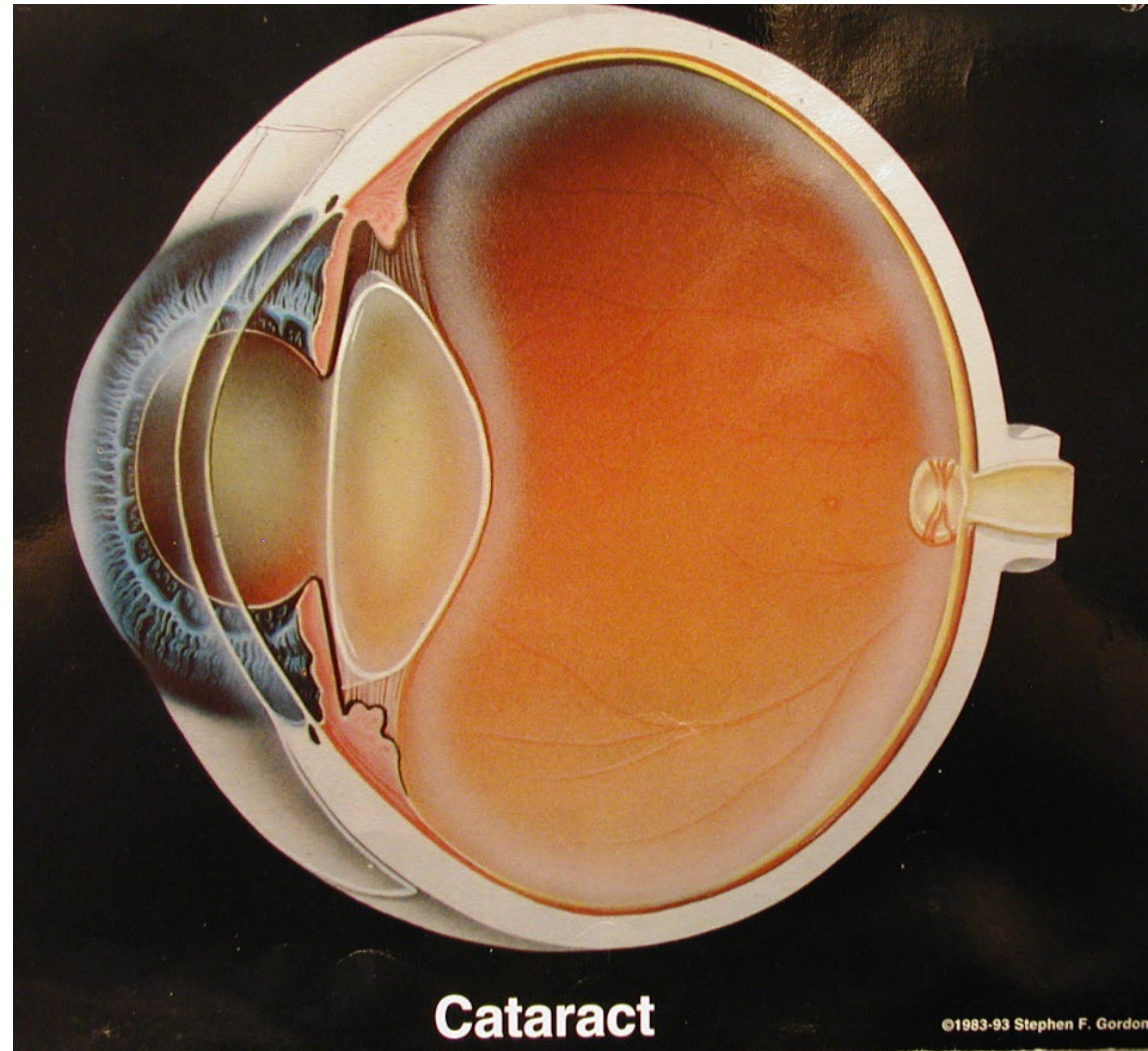


Cataract blocking & distorting central vision



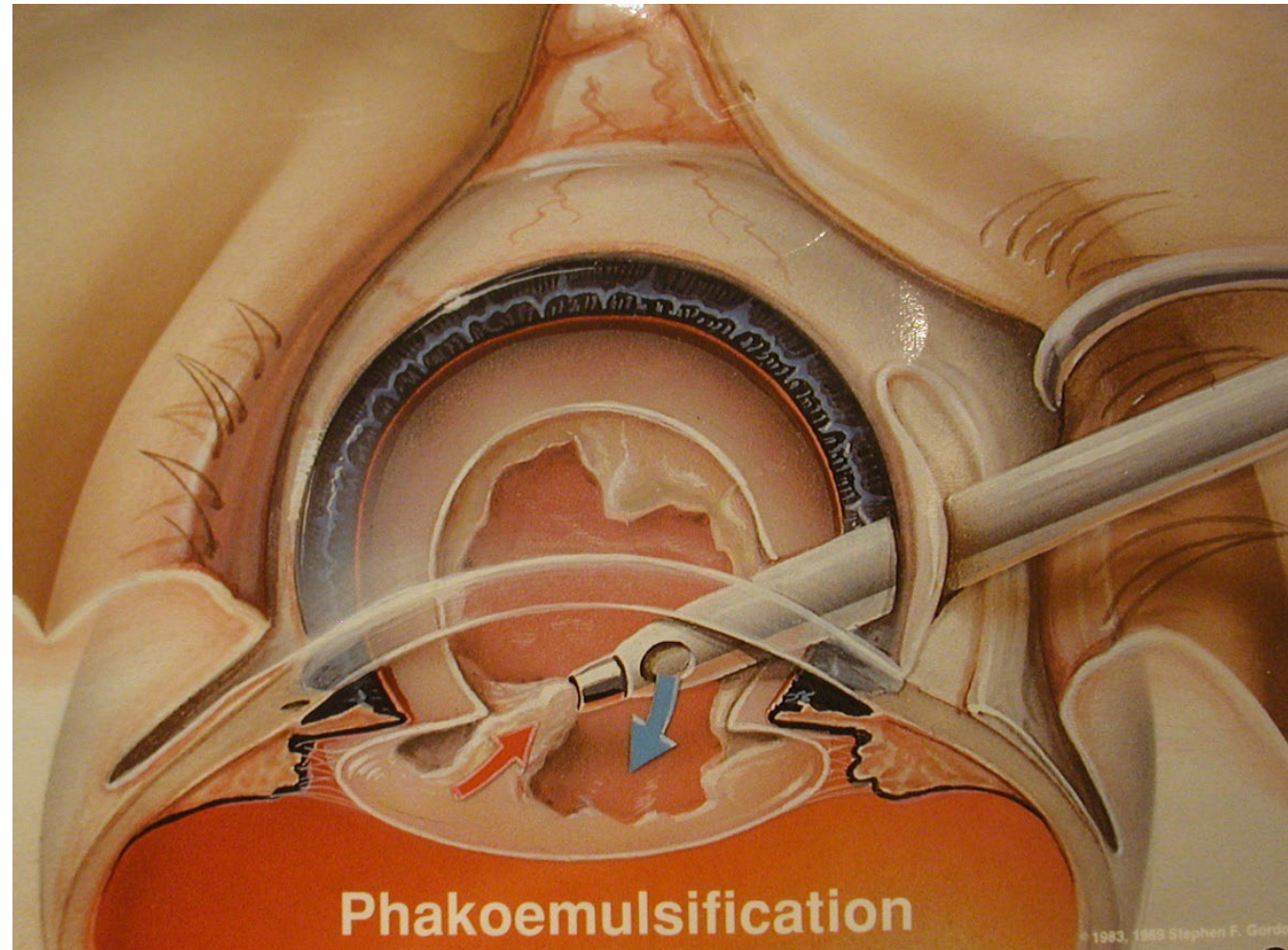
Cataract disrupts transmission of light through lens. Images may be blurred, dark & distorted.

Cataract

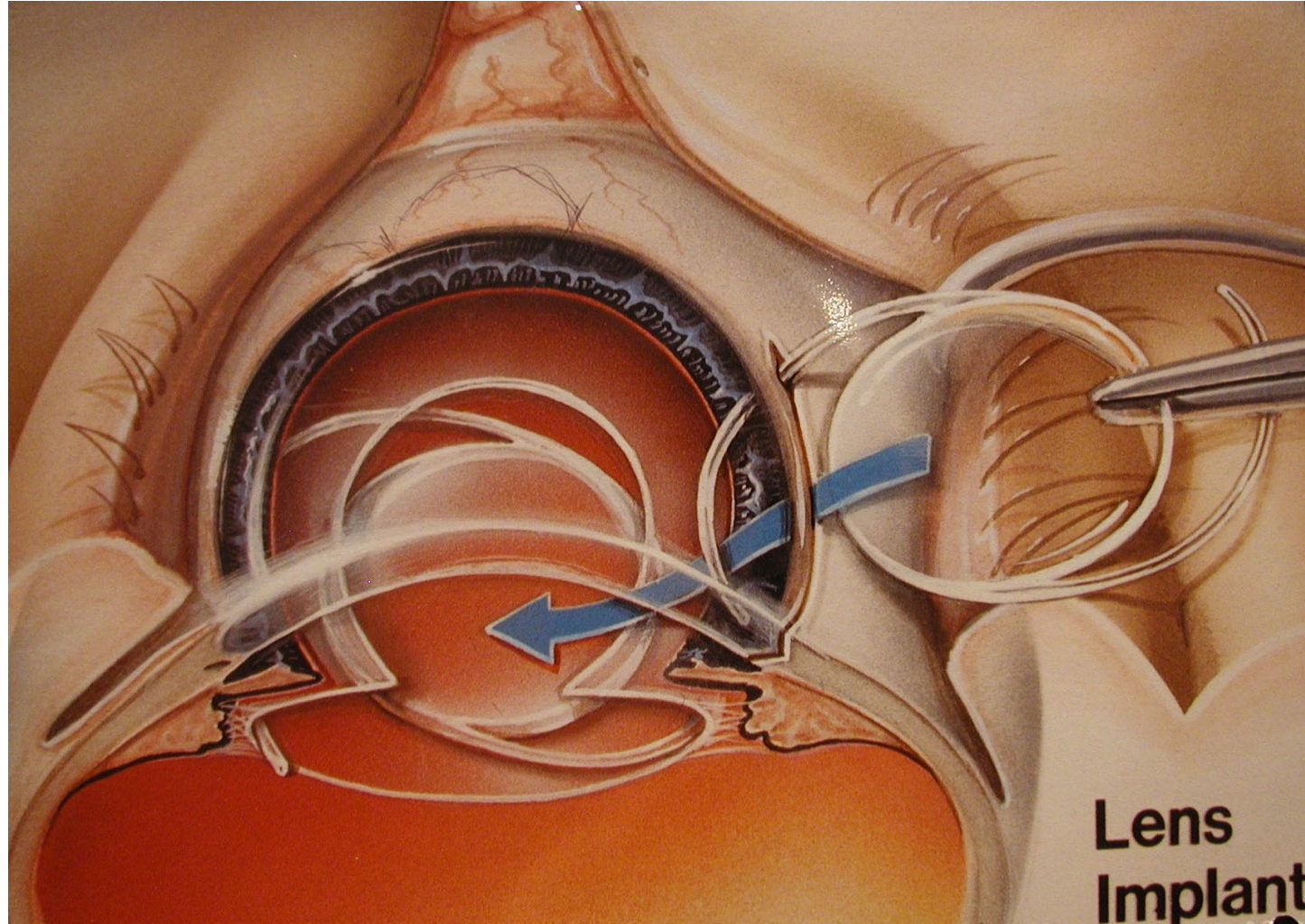


- Most common surgery done in US.
- Very successful. 95% of patients have improved vision.
- **Cataract** is removed from its surrounding **capsule**.
- Replaced with an **artificial intraocular lens**.
- **Advancements:**
 - incision size, irrigation fluid, time, lenses, safety, laser.

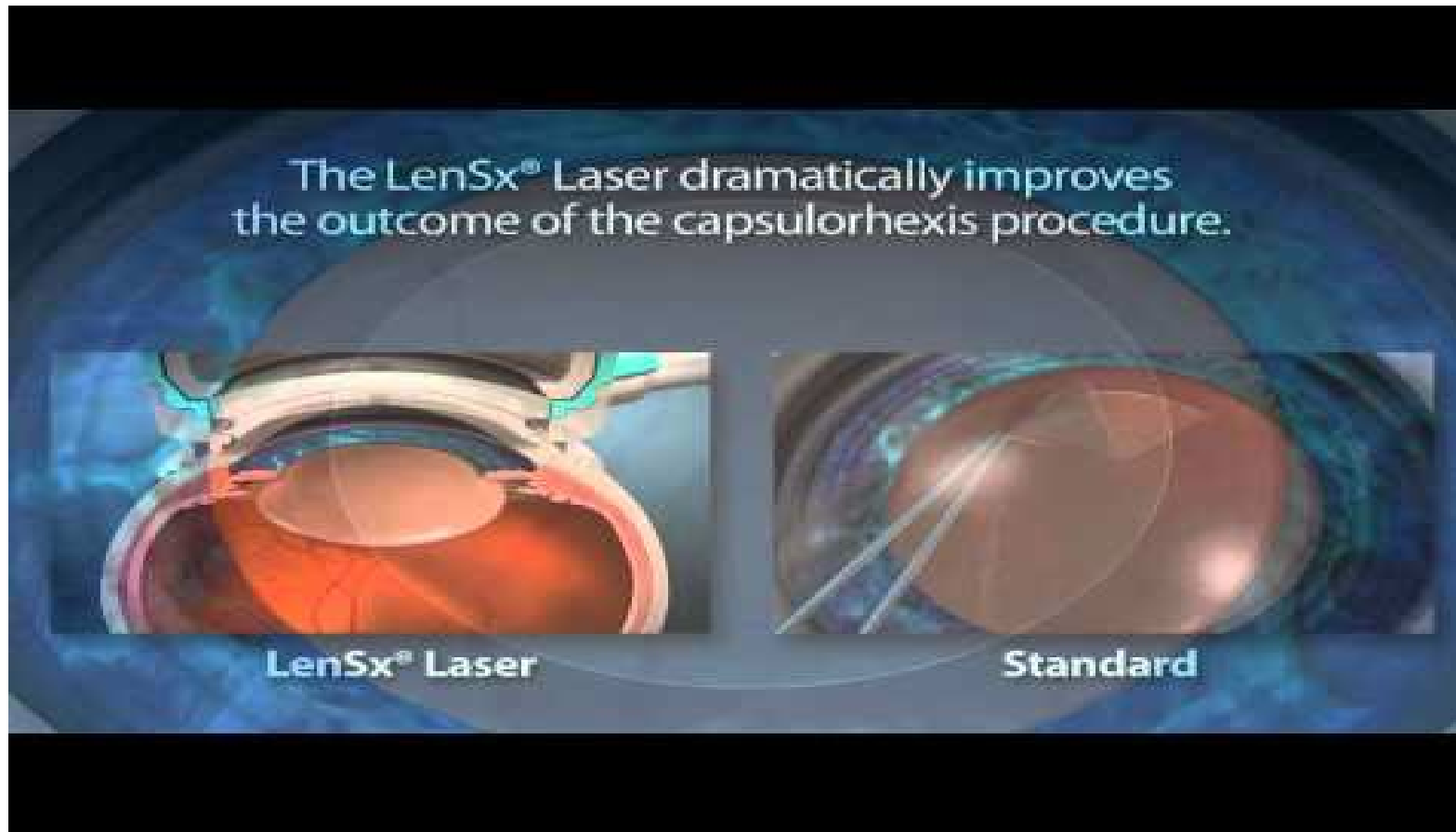
Traditional Cataract Surgery



Lens Implant



Traditional vs Femtosecond Laser Assisted Cataract Surgery



Femtosecond Laser Assisted Cataract Surgery



Good Candidates	Not Candidates
Pupil size dilated >5.5 mm	Corneal Scarring
Refractive goals <ul style="list-style-type: none">- Astigmatism- Lens Position	Poor Dilation
Potential for Good Vision	Previous RK or Bleb

Femtosecond Laser Assisted Cataract Surgery



Risks	Benefits
Same as for Traditional Cataract Surgery	Precision/Accuracy
Subconjunctival Hemorrhage	Reproducibility
	Less Phacoemulsification Energy
	Stable Lens Position

Standard Monofocal

Premium Intraocular Lenses:

- *Used in conjunction with Femtosecond laser*

- Toric Intraocular Lenses

- Multifocal



AcrySof IQ PanOptix

- Accommodative Lenses *Crystalens AO*

Crystalens AO

- Elongated Focus Lens

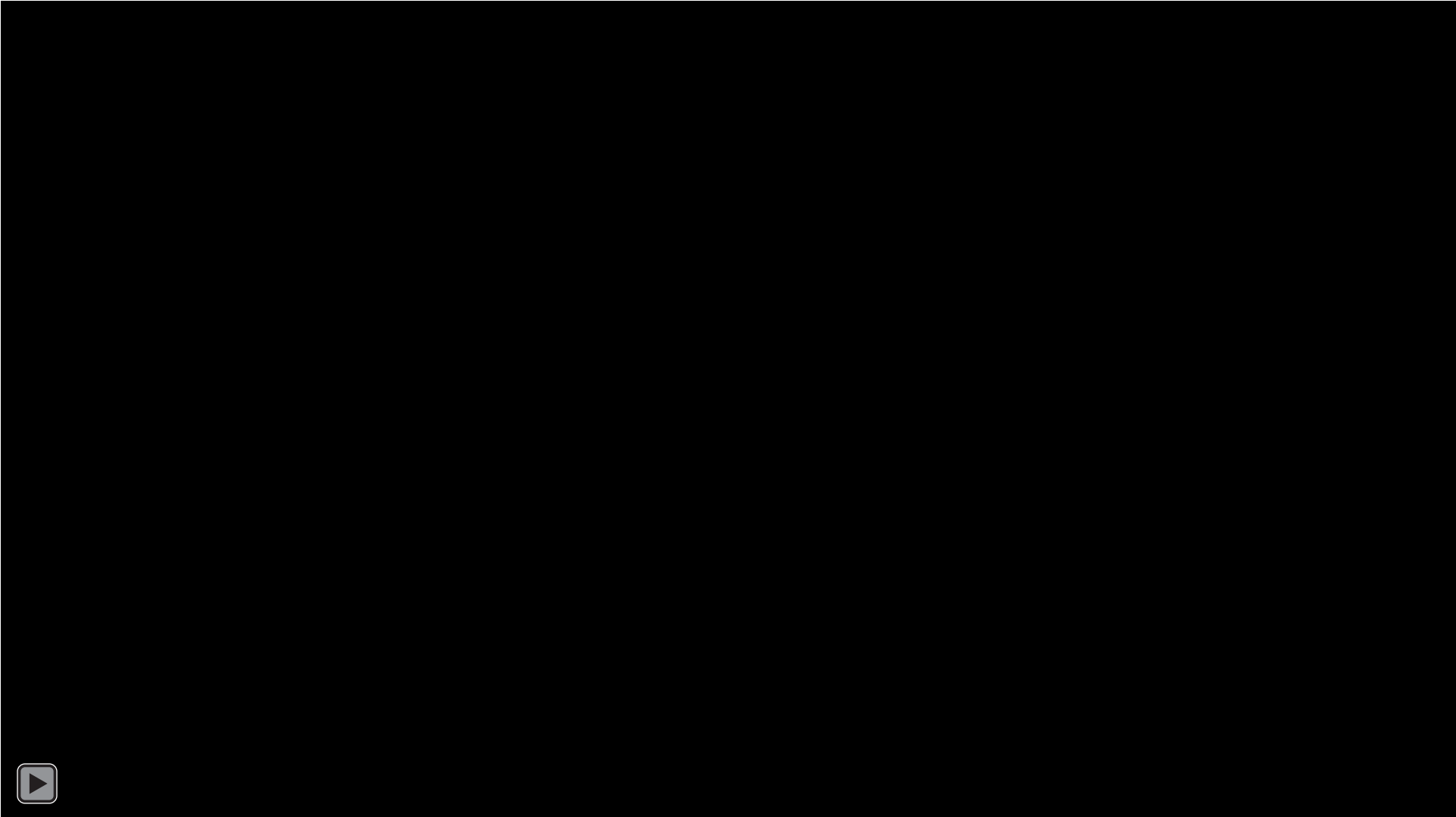


AcrySof IQ Vivity
EXTENDED VISION IOL

- Light Adjustable Lens



Monofocal Intraocular Lens

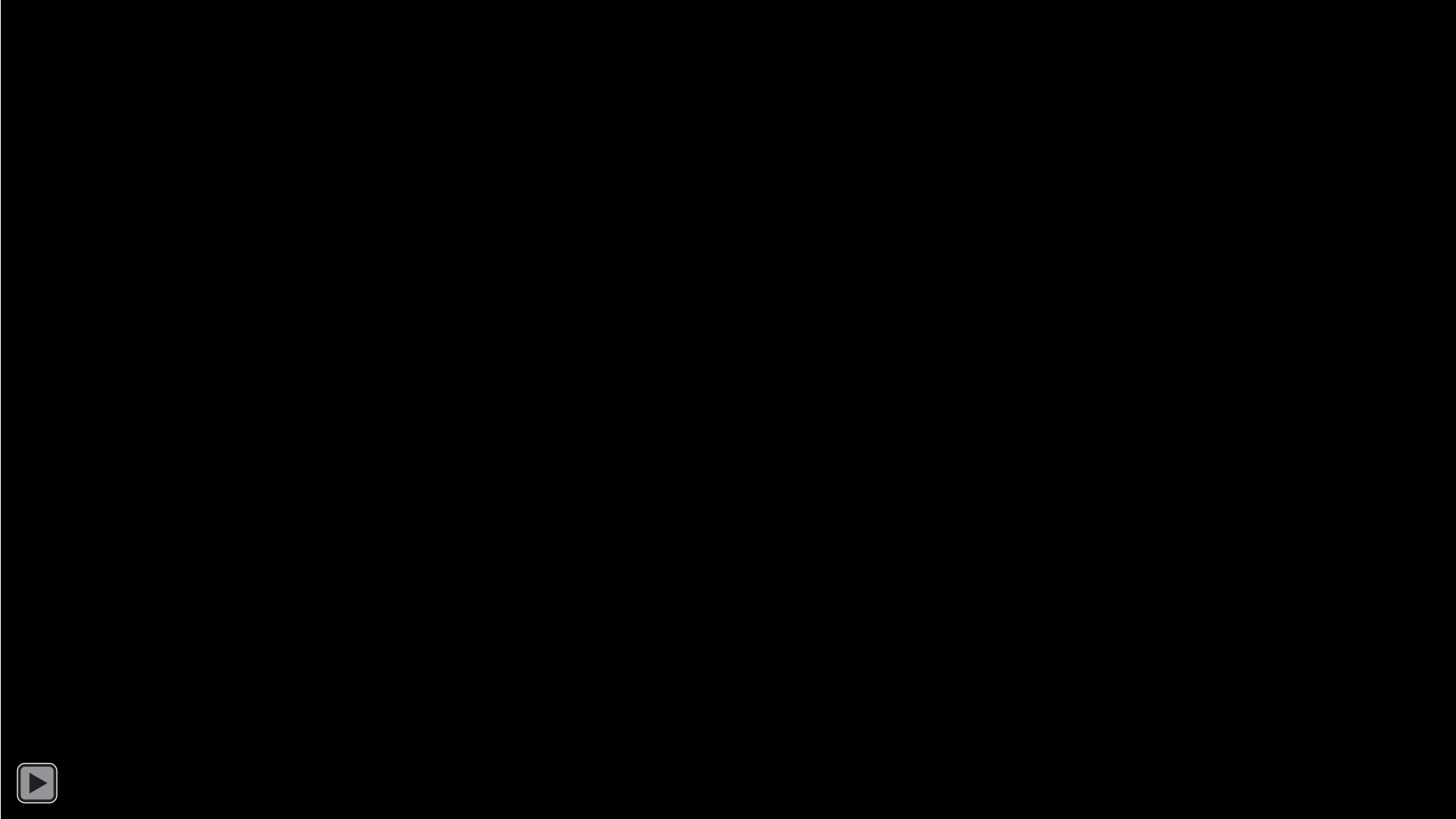


Toric IOL:

- Treats high degrees of astigmatism
- Corrects spherical aberration
- Wide range of powers
- Proprietary acrylic material
- Reduced chromatic aberration



Toric Intraocular Lens



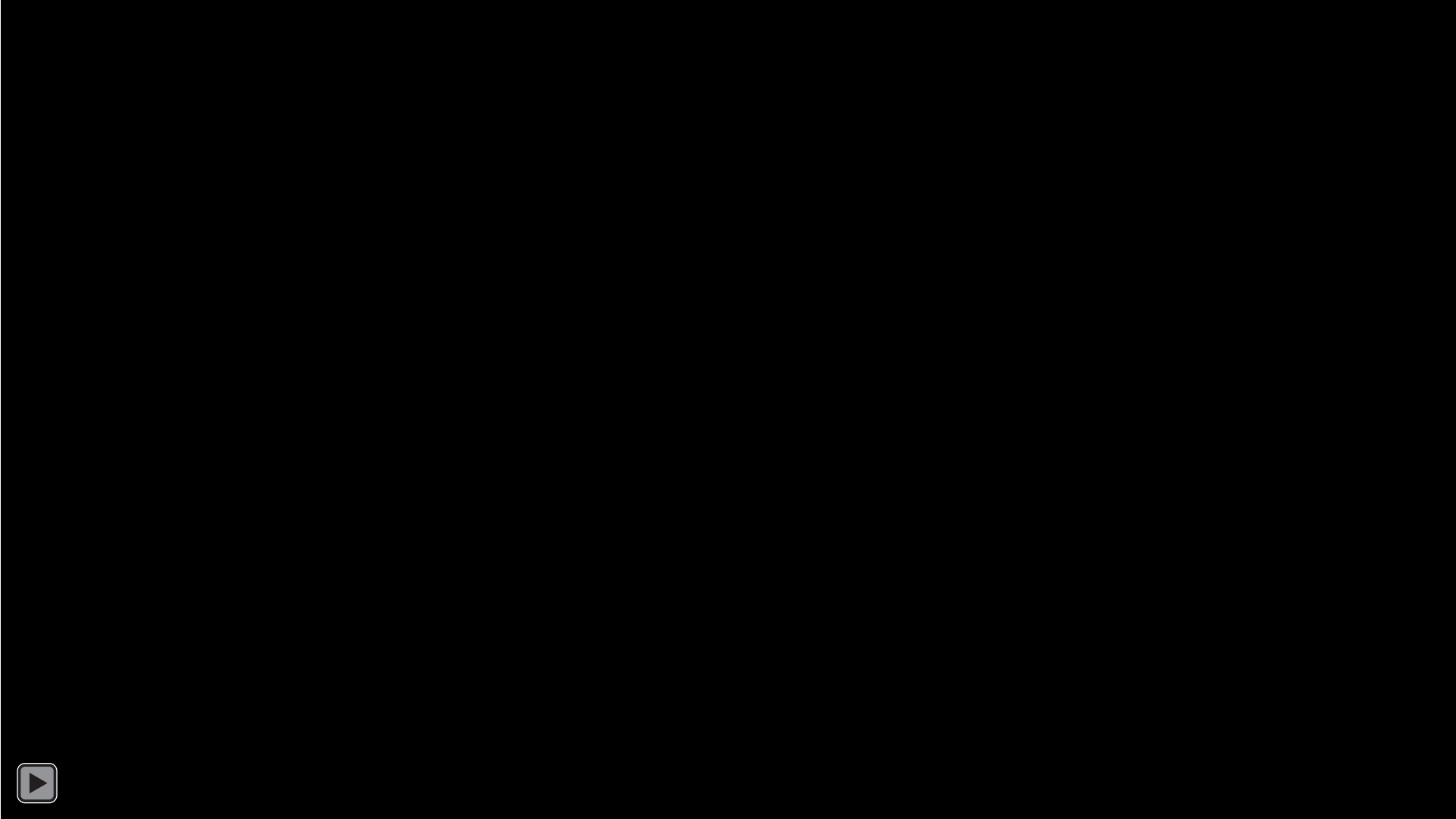
Abbott **TECNIS**[®]
MULTIFOCAL IOL
DIFFRACTIVE ASPHERIC

 AcrySof IQ PanOptix

- Multiple distances: Distance, intermediate, near
- Good for those who *hate* glasses at any distance
- Can cause "halo" effect or decreased contrast sensitivity



Multifocal Intraocular Lens

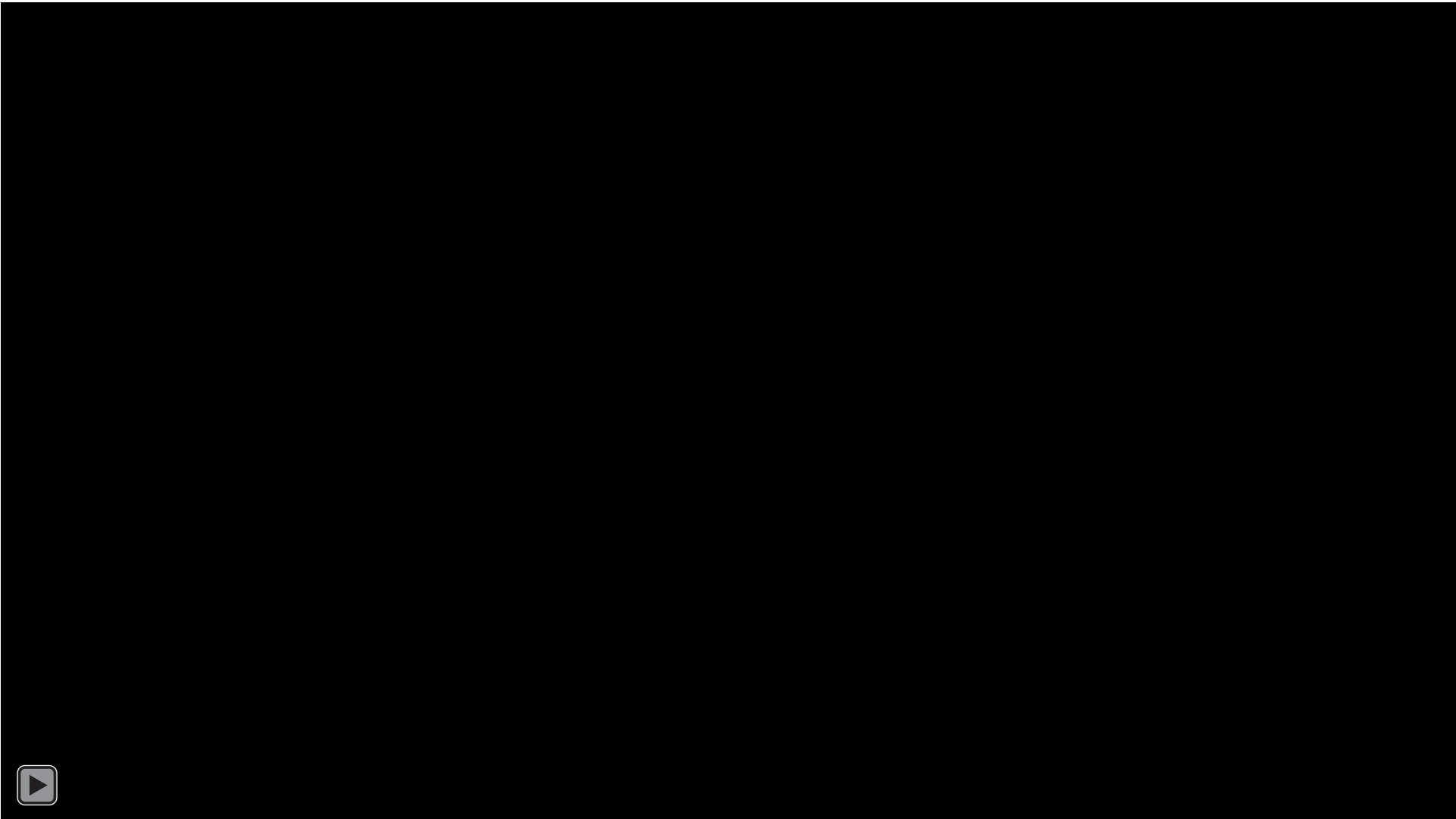


Bausch and Lomb *Crystalens*®AO

- Primarily distance and intermediate
- Low incidence of glare and halos
- Does not work as well in high hyperopes
- Distance accuracy less predictable



Accommodative Intraocular Lens



Extended Depth of Focus IOL

- Primarily **distance** and **intermediate**
- Reduces chromatic aberration
- Better design for all refractive errors



TECNIS
Symfony[®]
Extended Range of Vision IOL



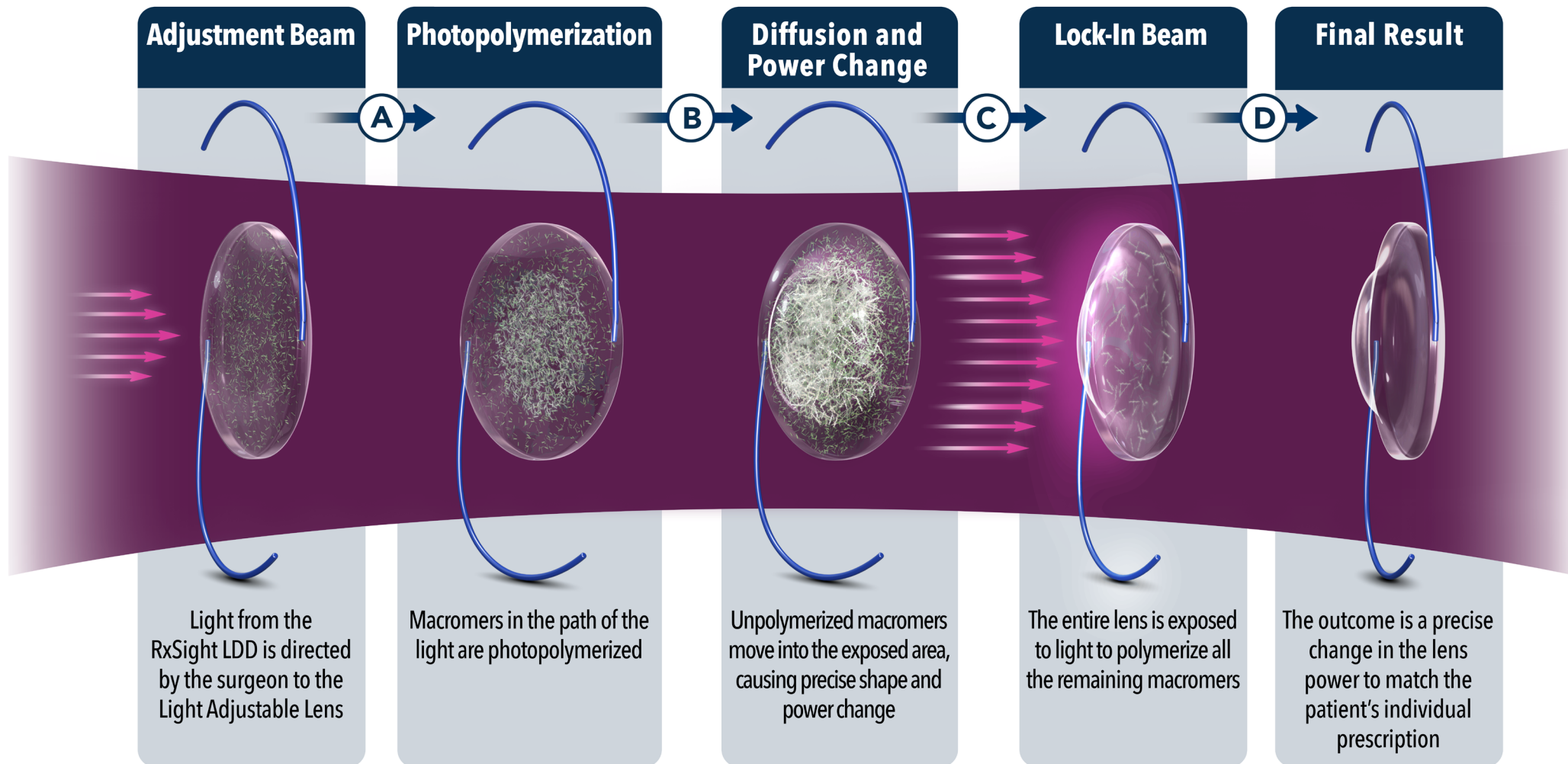
 AcrySof[®] IQ Vivity_™
EXTENDED VISION IOL



Light Adjustable Lens

- Developed in Europe and used for over a decade
- FDA approved in US in 2017
- 92% 20/25 or better without glasses
 - 92% within 0.5D of target (LASIK success)
 - Twice as likely to be 20/20 without glasses than control after 6 months
- Silicone lens with UV sensitive macromers
- Long term studies show stability > 7 years

Light Adjustable Lens Process



Light Adjustable Lens Process

- Standard surgery performed with LAL
- UV protecting glasses all waking hours until 24 hours after final “lock-in” treatment



Light Adjustable Lens Process

- First treatment 17 days after surgery



Light Adjustable Lens Process

- Additional treatments every 3-4 days
 - Can adjust lens 3 times



- Must have good eye dilation ($> 7\text{mm}$) to treat entire lens
- UV absorbing medications
 - Hydrochlorothiazide, tetracyclines
- Must wear special UV protecting goggles for entire treatment period (4-5 weeks)

- Good for:
 - Post-refractive surgery patients (Lasik, PRK, RK)
- Major advantage:
 - Correct ANY refractive error AFTER surgery.
- Other technologies (i.e., multifocal lens) can result in great outcomes but predictions can NEVER be as consistently accurate as treating the outcome.
- Takes the complexity OUT of the operating room and moves it into the clinic.

Predicting vs Treating the Outcome Boulder Community Health

- “Off the rack” suit/dress
- Tailor fit



Until recently, ALL cataract surgery is a predictive model.

- Incredible variation between humans makes it impossible to predict every outcome with certainty.
- No option to “try it on” or adjust easily after surgery unless willing to have additional surgery (LASIK or lens exchange).

- **GOOD - standard surgery**
 - Glasses for best vision (near and often distance)
- **BETTER - Laser + standard lens**
 - Good distance vision - glasses for reading
 - Limited astigmatism treatment
 - Unavoidable risk of spherical error
- **BEST 1 - Laser + EDOF/multifocal/accommodating lens**
 - Unavoidable risk of spherical error
- **BEST 2 - Light Adjustable Lens**
 - Distance vision with readers or mono vision (1 near, 1 far)
 - Superior if previous refractive surgery (LASIK, PRK, RK)
 - Treat according to experience, NOT prediction

- THERE IS NO PERFECT LENS.
- Rapid evolution of options.
- Customized personal treatment is best.
- Make realistic goals and expectations to determine which approach is best.
- No single approach is best for everyone.
- **Talk with your surgeon.**

Latest Advances in Cataract Surgery

Samuel Long, MD
Boulder Eye Surgeons
303-625-6451