

# National Optometric Association 2024

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**Disclosures**

**NONE**



# Ocular Prosthetics For Seeing and Non-Seeing eye

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# Visibility Tint (Visitint)



- ▶ Tinting of lens material intended only to make lenses easier to find when dropped or dislodged on the eye
- ▶ Typically, a light blue
- ▶ Does not change eye color or color perception
- ▶ TQ shows which have it and which don't
- ▶ Not a “specialty” feature

# Cosmetic Tints

- ▶ “Cosmetic SCLs”- Generally refers to lenses used to simply change the iris color of one’s eyes
- ▶ Two types: Opaques and Enhancers
  - ▶ Opaques make brown eyes blue, or green, or violet, or gray, or jade, or hazel...
  - ▶ Enhancers make blue eye bluer, or green eyes greener
    - ▶ Not effective in changing color
  - ▶ Cost about 50% more than clear counterparts
- ▶ Also, not a “specialty” feature

# Prosthetic SCL

- ▶ Prosthesis (*n.*) An artificial device that replaces a missing body part.
- ▶ Prosthetic CLs most useful where a scarred cornea alters or obliterates the appearance of an iris and/or pupil



# Prosthetic SCL (PCLs)

- ▶ Most are prescribed from among a set of pre-programmed colors
- ▶ Doctor's job is to find closest match
- ▶ Company provides a hand-held template for comparison with fellow eye
- ▶ Darker eyes much easier

to achieve a pleasing  
cosmetic appearance



# PCLs- Coloring Process

- ▶ Most pre-programmed color options are a dot-matrix process made up of dot of one, two or three colors
  - ▶ More colors tend to look more natural
- ▶ Some laminate materials so dot matrix is covered with CL material providing better comfort
- ▶ Most companies make 12-24 stock iris colors
- ▶ Typically cost over \$200 after all features added



# PCLs for Seeing Eyes

- ▶ For seeing eyes:
  - ▶ Lenses may be ordered with a clear (open) pupil
    - ▶ Available in various stock pupil sizes (3.5 to 5.0mm)
  - ▶ Available with almost any Rx
    - ▶ Up to +/- 30.00 DS
    - ▶ Up to -10.00 cyl, any axis
  - ▶ Eg, colobomas, iridodialysis, iris sphincter tears, etc



# PCLs- Underprints

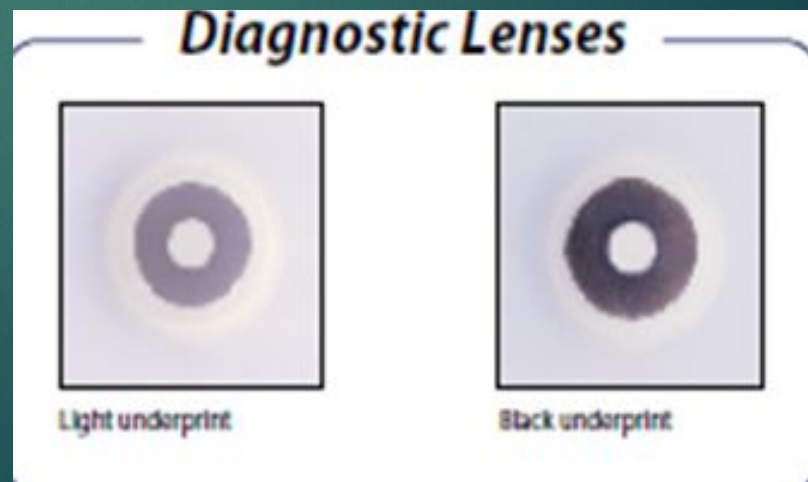


- For seeing eyes with marked photophobia:
  - Dot matrix allows significant light through, so...
  - May need to add underprint
  - Underprint blocks additional light

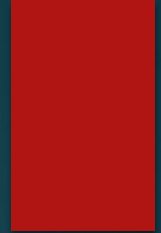
# PCLs- Underprints

Two underprints available

- Dark- Best for blocking unwanted light
  - Not very appealing with light colors
- Light- Less light block but better cosmesis in lighter-colored lenses



# $f$ -stop Function of PCLs



- ▶ Fixed, dilated pupils result in:
  - ▶ Photophobia due to the extra amount of light
  - ▶ Aberration due to aspheric shape of mid-peripheral and peripheral cornea
    - ▶ Aberration results in blur and greater photophobia
- ▶ Though the artificial pupil provides an  $f$ -stop function at a position less than optimal, it does limit rays of light to the more appropriate surface of the apex □ better VA

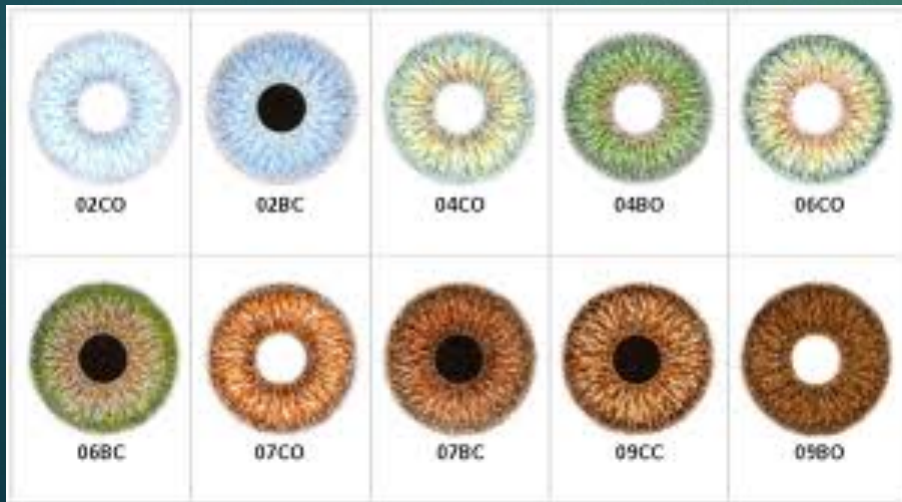
# Hand-Painted Prosthetic SCL

- ▶ Hand-painting is very precise in color match
- ▶ Dense color- Underprints not necessary
- ▶ Especially useful for lighter colored eyes
- ▶ Contact company prior to seeing pt for order
  - ▶ Some require Polaroid photo, some want digital
- ▶ Company usually paints two
  - ▶ You keep one, mail the other back
- ▶ You provide the lens, they paint it
- ▶ Cost \$400-500, lens and service



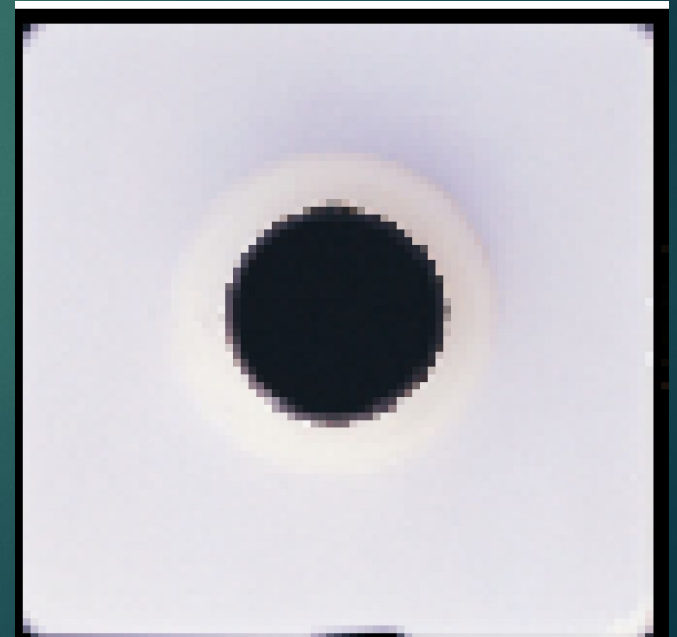
# PCLs for Non-Seeing Eyes

- ▶ Blind/disfigured eye, open pupil not desirable
- ▶ Black prosthetic pupil can be added to prosthetic iris color on any lens
- ▶ Available in several sizes on stock lenses (3-5mm)
- ▶ May be any size on custom and hand-painted



# Occluder Lenses

- ▶ Simply a black lens, very little light gets through
  - ▶ Tends to fade with time, loses occlusion efficacy
- ▶ Effective patching therapy for amblyopia
- ▶ Effective patching therapy for diplopia
- ▶ Available in quarterly replacement (\$110 4-pack)




# Occluder Lenses

- ▶ “Tailored” or partial occlusion for amblyopia

Journal of Pediatric Ophthalmology and Strabismus 12(6):565-8 (2008) Occlusion properties of prosthetic contact lenses for the treatment of amblyopia. RS Collins, ME McChesney, CA McCluer, MP Schatz Wilford Hall Medical Center, Lackland AFB, San Antonio, Texas 78236.

- ▶ Varying the size of a “prosthetic” pupil allows for varying penalization while permitting peripheral fusion
  - ▶ May bode better for rehab





# Tinted “Sports” Contact Lenses


The Marietta claims:

Amber: Blocks blue light for contrast and visual acuity on grass and against blue skies.

Sports: baseball, softball, football, cycling, fishing, golf, hunting, skiing, water sports.

Grey Green: Heightens contrast (mildly) while preserving color balance and reduces brightness.

Sport: golf



# Tinted “Sports” Contact Lenses

The Marietta claims:

Bolle Blue: Blocks blue light to heighten contrast and visual acuity. Sports: football, tennis

Green: Heightens contrast (mildly) while preserving color balance. Application: Use in bright outdoor light

Yellow: Filters blue light better contrast in overcast, hazy, low-light conditions and for indoor sports.  
Sports: hunting, football (night games)

Sun Tac: Reduces overall brightness while preserving 100 percent normal color recognition.  
Applications: Great for outdoor sports, especially running.

# Tinted “Sports” Lenses (cont)

- ▶ Nike MaxSight (no longer available)
- ▶ Was available in two tints. Claim the following:
  - ▶ Amber tint – “Great for sports that require fast response and action. Fast moving sports like soccer, football, tennis and baseball. Amber tints were solely created for determining quick moving balls. Amber tinted Nike MaxSight contact lenses work by reducing variable light that sorts out certain wavelengths in the blue green section of our surroundings, making the ball "pop" off the setting.”
  - ▶ Grey-green tint – “Perfect for sports that are played under bright lights (outdoors) and vast surroundings like training, track and field and golf which needs supreme comfort and limited glare. This works by enhancing the red and green parts of your environment to increase the detail and outline identification of your atmosphere.”

# Replacement for Nike Max?

**ALTIUS™**  
REVEAL  
WHAT'S  
POSSIBLE™

PERFORMANCE-TINTED  
CONTACT LENSES



# Color Vision Deficit Lenses

- ▶ A red lens (X-chrome) allows CV Deficient patients to see the hidden numbers on PIP testing
- ▶ Skews color spectrum



- ▶ Wikipedia states: “Optometrists can supply a singular red-tint contact lens to wear on the non-dominant eye. This may enable the wearer to pass some color blindness tests, but they have little practical use.
- ▶ Some doctors and agencies consider them nothing more than a “cheater” lens

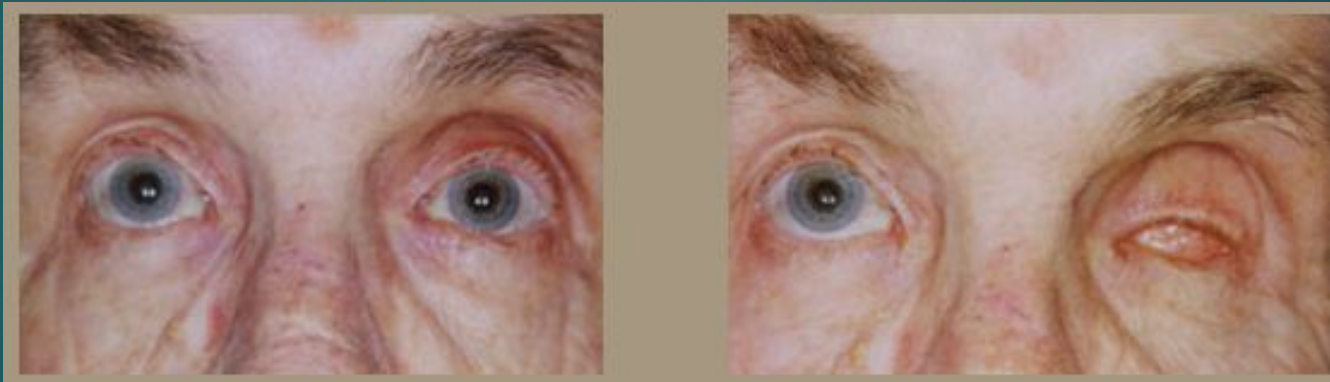
# Novelty CLs

- ▶ Generally considered costume accessories
- ▶ Most accept most spherical Rxs
- ▶ Some make torics
- ▶ Cost: \$30 - \$210
  - ▶ Compliance with care regimen a common problem
- ▶ “Must have Rx”; but can easily be bought online and even at flea markets



# Prosthetic Shells

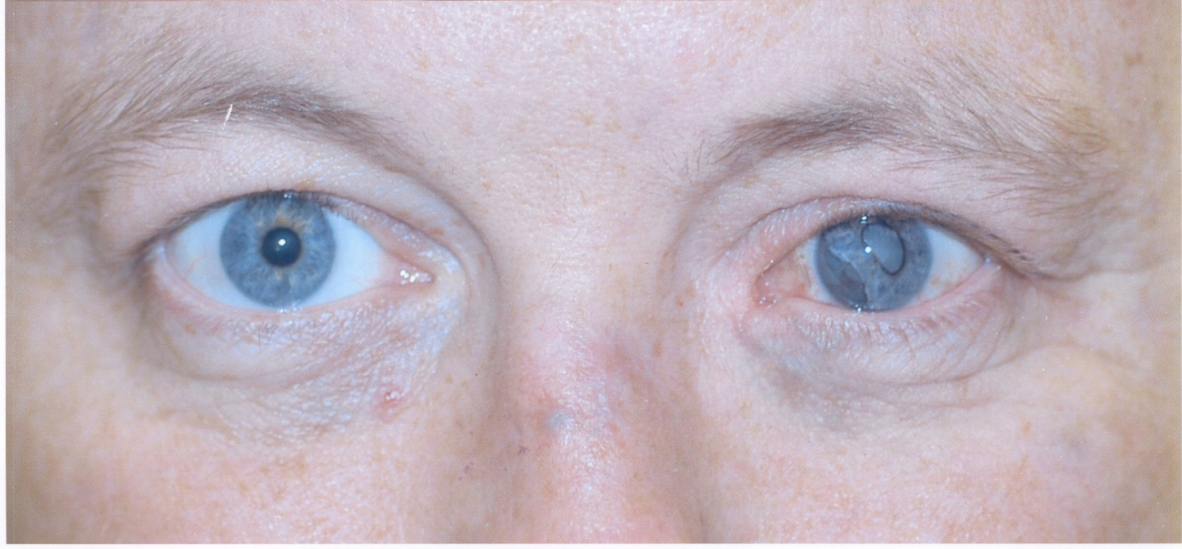
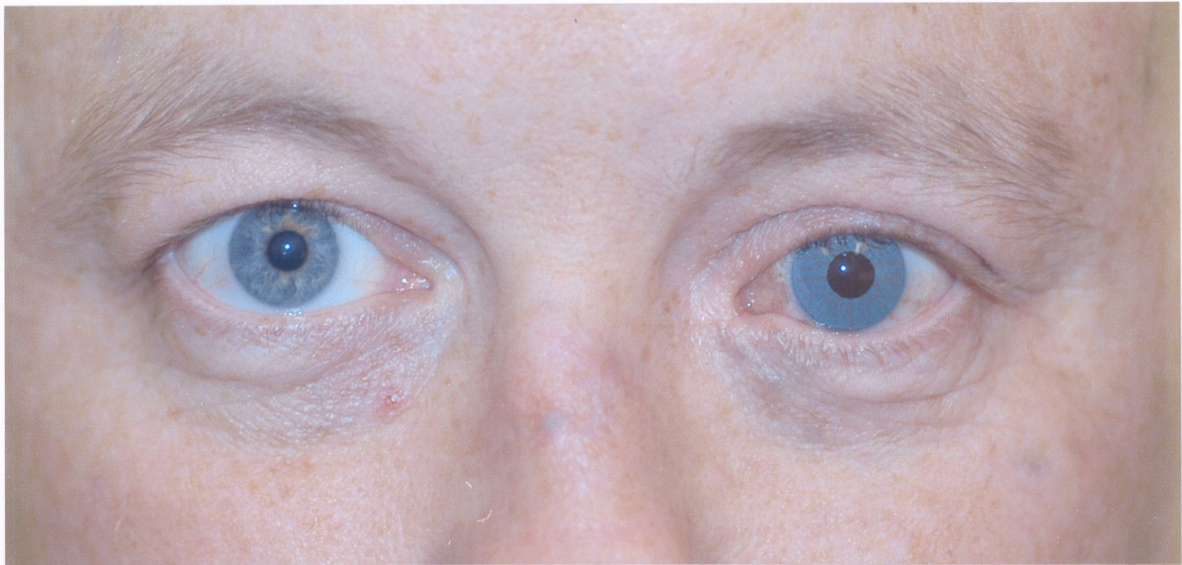
- ▶ Not a traditional “contact lens”
- ▶ Acrylic or PMMA shell worn on/over a disfigured globe or implant after enucleation
- ▶ Especially useful if globe is phthisical and lid has sunken appearance
  - ▶ Provides bulk to fill out lid structure



# Rigid Corneal Prosthetic Lenses

- ▶ Hand-painted and layered to maintain color
- ▶ Same options as prosthetic SCLs
- ▶ Advantages:
  - ▶ Durability
  - ▶ Mask irregularity in seeing eye
- ▶ Disadvantages:
  - ▶ Very few companies do these
  - ▶ Cost
  - ▶ Hard to adapt to unilateral rigid lenses
  - ▶ Mobility/dislocation of lens











# Outline



1. **Prosthetic eye categories and types.**
2. **Eye removal surgeries.**
3. **Care, replacement, application and removal of an ocular prosthesis.**
4. **Orbital and prosthetic evaluation.**
5. **Basic and advanced in office procedures.**

# Is There A Need?

- ▶ **Estimated number of American's that lose an eye each year: 50,000.**
- ▶ **Estimated number of American's with ocular cosmetic issues and maladies: Millions**



# Indications for a Prosthesis

- ▶ **Enucleation/Evisceration**
- ▶ **Phthisis Bulbi**
- ▶ **Opaque Cornea**
- ▶ **Disfigured Eye**
- ▶ **Strabismus**
- ▶ **Double Vision**
- ▶ **Photophobia**





# Types of Prosthetic Devices



# Reform (Artificial Eye)

- ▶ **Curved disc of plastic having a center thickness of 3mm or greater**
- ▶ **May be coupled to an implant**
- ▶ **Colored and modified to duplicate natural eye appearance and features**
- ▶ **Can be trial fit, custom molded, or fit from a stock set.**
- ▶ **Should be replaced every 3-6 years.**



# Shell Prosthesis

- ▶ Curved disc of plastic with a center thickness of less than 3mm
- ▶ Designed to cover an intact eye or shallow socket
- ▶ Colored and modified to duplicate natural eye appearance and features
- ▶ Should be replaced every 3-6 years.



# Surgical Procedures

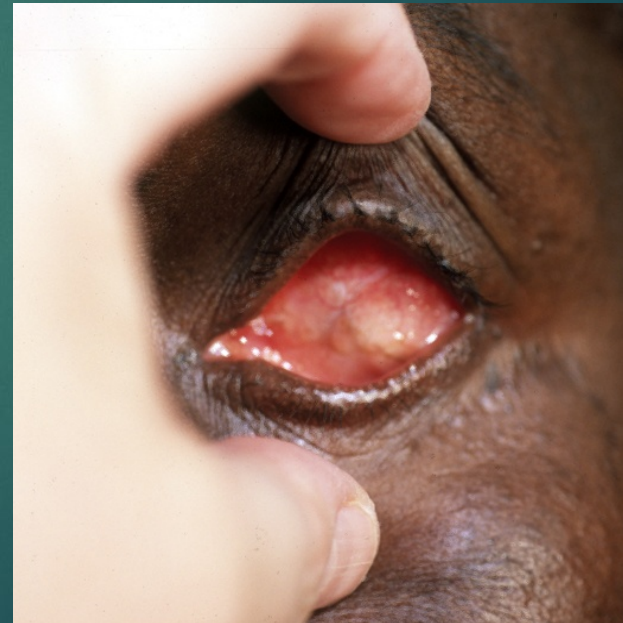
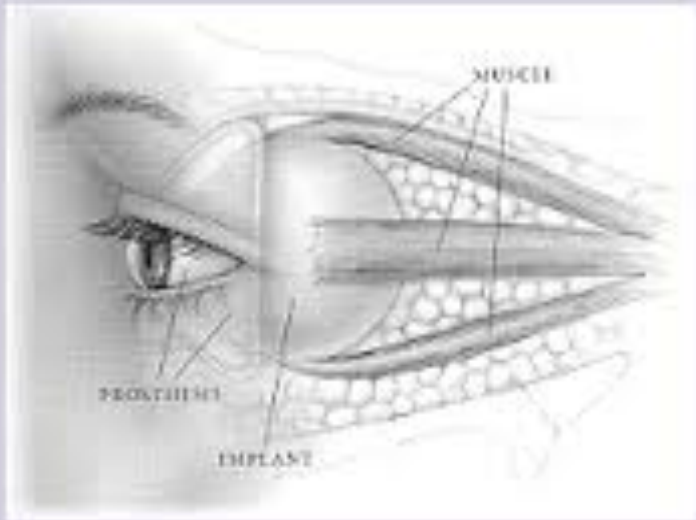
# Simple Enucleation / No Implant

- ▶ The globe is removed and conjunctiva closed without “replacement” of the orbital mass.
- ▶ At times, the Recti muscles are sutured, forming a stump under the conjunctival tissue layer that the prosthesis rests against. Minimal motility results.
- ▶ The prosthesis will generally be large and thick



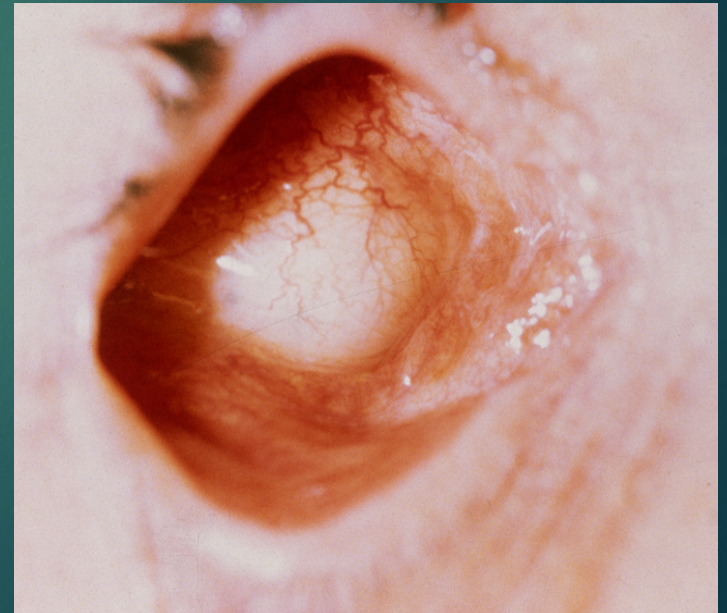
# Enucleation with an Implant

- ▶ When the globe is removed an implant is placed in the socket at the time of surgery
  - ▶ Replaces part of the volume lost when the globe is removed
  - ▶ Enhances motility of the artificial eye



# EVISCERATION

- ▶ The contents of the globe are removed and replaced with an implant (scleral wall, muscles, etc., remain)
- ▶ The cornea may or may not be present
- ▶ The size of the sphere used governs the thickness of the prosthetic
  - ▶ Large sphere = shell eye
  - ▶ Small sphere = reform eye



# EXENTERATION

- ▶ **The entire contents of the orbit are removed**
- ▶ **A large, thick eye may be used, if the eyelids remain, to hold the prosthetic in place**
- ▶ **This prosthesis will have no movement**
- ▶ **Facial restoration may be needed**



# Prosthetic Insertion

- ▶ **With or without suction cup**
  - ▶ **Ask patient to look down**
  - ▶ **Pull upper lid upward**
  - ▶ **Insert superior aspect of prosthetic under the upper eyelid**
  - ▶ **Pull the lower lid down**
  - ▶ **Push prosthetic in place within lid margins**



# Prosthetic Insertion



# Prosthetic Insertion



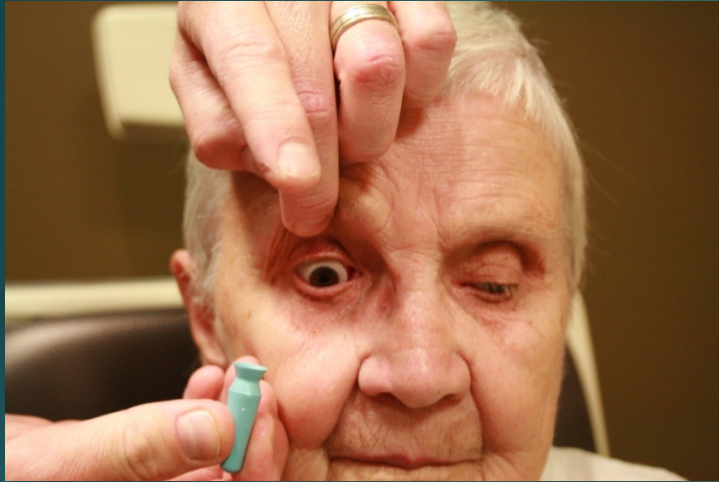
# Prosthetic Removal

- ▶ **With or without suction cup**
  - ▶ **Depress lower lid**
  - ▶ **Gently press in on the lower lid under prosthetic edge**
  - ▶ **Slide eyelid down and out**

# Prosthetic Removal



# Prosthetic Removal



# Prosthetic Removal





# Patient Evaluation

# Patient Privacy

- ▶ **Precautions must be taken to ensure that patient's privacy is maintained.**
  - ▶ **Cover windows on exam room doors.**
  - ▶ **Turn chair away from the door.**
  - ▶ **Instruct staff to knock before entering.**
  - ▶ **Ask the patient in private if they would like to have family/friends leave the room.**
  - ▶ **Inform individuals in the room when the prosthesis will be removed.**



# Reform Eyes

- ▶ Choose the shape that fits the socket
- ▶ Reduce the shape by cutting off plastic using a dremel and cut-down stone bit or enlarge the shape with wax layered on the shape
- ▶ Trial all modifications in the socket
- ▶ Mark the pupil and scribe an iris to verify alignment.



# Reform Eyes

- ▶ **Once the shape and iris position are determined, the iris and scleral colors can be chosen from sample stock eyes or photo documentation can be used.**



# Injection Molding

- ▶ **Benefits:**
  - ▶ Reduced rotation for shell prostheses.
  - ▶ “Lock in key” fit resulting in improved movement.
  - ▶ Improved comfort in most cases.
- ▶ **Disadvantages:**
  - ▶ Increased chair time.



# Injection Molding



- ▶ Use either a scleral lens, reform eye held with a suction cup, or an impression tray for the procedure
- ▶ Mix the impression material until the consistency of sour cream
- ▶ Fill the shape with the impression material and insert/inject into socket
- ▶ Fill the space in the socket

# Ocular Prosthetics

## Questions