

## **Ten Innovations in Contact Lenses That You Need to Know About**

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### **Summary**

Advances in contact lenses are increasingly optimizing our efforts for our patients. This course will update the attendee with advances in contact lenses that will help them enhance their patients wearing experience.

### **Learning Objectives**

- 1) Understand new surface treatment technologies
- 2) Discuss filling solution advancements
- 3) Understand advanced technologies to measure the ocular surface
- 4) Discuss scleral lens advances
- 5) Understand myopia progression management options
- 6) Discuss advances in presbyopia management

### **Outline**

- 1) New Surface Treatments
  - a. Hydrophilic surface treatment
  - b. Can be applied to:
    - i. Gas permeable (GP) surface
      1. Corneal GP
      2. Scleral lenses
    - ii. Soft lens surface
      1. Hybrid lens
  - c. Polyethylene glycol that is permanently bonded to the surface of the lens
    - i. Ninety percent water
  - d. Reduces lipid deposits
  - e. Improves surface moisture
  - f. Only certain solutions are approved to be used with lenses with this treatment
    - i. Tangible Clean
    - ii. Boston Simplus
    - iii. Unique PH
    - iv. Clear Care
    - v. Clear Care with Hydra-Glyde
    - vi. Lenses cannot be rinsed with water
    - vii. Lenses cannot be stored dry
  - g. Stripping the treatment off of the lens does not ruin the lens

- i. Exposure to water, abrasive cleaners and storing the lens dry will strip the treatment off of the lens
    - ii. If this occurs, lenses are simply left with traditional
  - h. Solutions available to replenish surface treatment that may have reduced over time
    - i. Reformulates the polyethylene glycol treatment
    - ii. Monthly soaking solution
- 2) Scleral filling solutions
  - a. Post lens tear reservoir needs to be non-preserved solution
  - b. Addipack Saline
    - i. 0.9% sodium chloride
  - c. ScleralFil
    - i. Boric acid
    - ii. Sodium borate
    - iii. Sodium chloride
  - d. LacriPure
    - i. 0.9% sodium chloride
  - e. Nutrifill
    - i. Calcium
    - ii. Magnesium
    - iii. Potassium
    - iv. Sodium
    - v. Phosphate
- 3) New diagnostic advances for identifying corneal disease for specialty fits
  - a. Anterior segment photography
    - i. Cobalt blue light
    - ii. Wratten #12 filter
    - iii. Off-set angle of image capture
  - b. Anterior segment optical coherence tomography (OCT)
    - i. Total corneal sagittal depth
    - ii. Total corneal thickness map
      - 1. Fuch's endothelial dystrophy
      - 2. Corneal thickness
        - a. Keratoconus detection
        - b. Irregular cornea mapping
    - iii. Epithelial thickness map (ETM)
      - 1. Normal range is 50-59um
      - 2. Can follow orthokeratology with ETM
      - 3. Epithelial basement membrane dystrophy
      - 4. Post-LASIK and post-RK
      - 5. Keratoconus
  - c. Multi-functionality
    - i. OCT with multi-mode functionality
      - 1. Anterior segment photography

2. Topography
    - a. Posterior surface topography
  3. Corneal thickness
  4. Corneal epithelial thickness
- 4) Advancements in sagittal depth measurements
- a. Large anterior segment OCT scans
  - b. Measure 18mm in the horizontal meridian
  - c. Can measure sagittal depth at various chord lengths
    - i. Horizontal chord lengths can correspond to diameter of lens
    - ii. Scleral lenses
      1. Can measure sagittal depth from chord created to anterior surface of cornea
      2. Can then select an appropriate diagnostic lens sagittal depth to place on the eye by adding 300um to the sagittal depth
    - iii. Soft lenses
      1. Create chord corresponding to the diameter of the lens
      2. Can measure sagittal depth from chord created to the anterior surface of the cornea
      3. Can compare sagittal depth to the sagittal depth of the lens based on Pacific University Sagittal Depth Chart
        - a. <https://commons.pacificu.edu/work/ns/380b99ad-5f0b-4e77-a286-a8d1f74bdf9>
  - d. Can assess scleral slope
- 5) Advancements in scleral lens landing zone design
- a. Traditionally scleral lenses were made with spherical shaped landing zone
  - b. Understanding of the scleral shape, we realized that the sclera is not spherically shaped
  - c. New diagnostic lenses are now created with toric landing zones to better mimic the scleral shape
  - d. Allows opportunities to better match the shape of the ocular surface
  - e. Understand how to interpret landing zone OCT scans
- 6) Myopia progression management advances
- a. Orthokeratology
    - i. Lenses are slept in and taken off of the eyes the next morning
    - ii. Reshapes the cornea in the evening by providing a flat base curve centrally and then a reverse curve in the periphery
    - iii. Flattens base curve providing myopic correction
    - iv. Reverse curve adds optics that provide benefits in myopia management
  - b. Misight
    - i. First FDA approved lens for myopia management
    - ii. Daily disposable lens
  - c. NaturalVue Multifocal
    - i. Multifocal with distance center optics

- ii. Daily disposable lens
  - d. Hybrid Lenses
    - i. Distance centered lenses
  - e. Biofinity multifocal lenses
    - i. Come in both distance center and near center lenses
    - ii. Distance center lenses are used for myopia management
    - iii. Monthly disposable lens
  - f. Atropine
    - i. Currently only available from compounding pharmacies
    - ii. Creates inconsistencies in the concentrations that are available
    - iii. New technologies will provide a stable way to deliver low concentration atropine
  - g. Blue light
    - i. In a virtual reality headset
    - ii. Exposes blue light on the optic nerve
    - iii. Increase dopamine in the retina
    - iv. Reduces myopia progression
    - v. Not currently FDA approved
- 7) Presbyopia advances
  - a. Offset Optics
    - i. Patients typically look through a portion of the pupil that is located nasal to the geometric center
      - 1. Angle kappa
      - 2. Angle lambda
    - ii. Traditional multifocals have their multifocal optics located in the center of the lens
      - 1. This can make it undesirable
    - iii. Off-setting the optics nasally can align the optics more appropriately to the patients line of sight
    - iv. SpecialEyes 54 Multifocal
    - v. Zenlens Multifocal
      - 1. Assess vision binocularly
  - b. New monthly multifocal with astigmatic correction available
    - i. Samfilcon A
      - 1. Near center design
    - ii. Comfilcon A
      - 1. Near center design
      - 2. Distance center design
- 8) Contact lens communication platforms
  - a. New technologies provide opportunities to communicate with our patient in intelligent ways
  - b. Provide an opportunity to remind patients about when they may need contact lenses

- c. Provide sophisticated online portal that allows ordering to occur directly from a patient's cell phone
  - d. Several independent entities and large lens manufacturers have created new platforms
- 9) Contact Lens material advances
- a. Soft
    - i. Surface treatments
    - ii. Material advances
    - iii. Nutrients within the lens matrix
  - b. Rigid
    - i. High oxygen permeable materials
    - ii. Understand hydrophilic characteristics
- 10) Presbyopia drops
- a. Cholinergic agonists
    - i. Pilocarpine
      - 1. Cholinergic agonist
      - 2. Different concentrations from what is commercially available will emerge
      - 3. Will be utilized alone and in combination with adrenergic antagonists
    - ii. Carbachol
      - 1. Long duration of action
      - 2. May be combined with alpha-2 adrenergic agonists
    - iii. Aceclidine
      - 1. Has strong affinity for muscarinic receptors on sphincter
      - 2. Has low affinity for muscarinic receptors on ciliary muscle
      - 3. Long duration of action
      - 4. May be combined with alpha-2 adrenergic agonists
  - b. Adrenergic antagonists
    - i. Inhibit dilator muscle
    - ii. Can be used in combination with cholinergic agonist
  - c. Alpha-2 adrenergic agonist
    - i. Prevents pupil dilation
    - ii. Acts on the alpha-2 adrenergic receptors on the pre-synaptic nerve of the dilator muscle reducing nor-epinephrine produced in the cleft