

## Advancements in GP Materials and Coatings

Jeffrey Sonsino, O.D., F.A.A.O.

### Summary:

Successful management of the patient with irregular corneas with contact lenses can sometimes be a frustrating process for both the patient and the practitioner. In most cases, advanced contact lenses are not curing the underlying condition for why they are being used. For example, in ocular graft-versus-host disease, we use scleral lenses to protect the ocular surface. But, we are not changing the functioning of the injured Meibomian glands. So, we are just exchanging the surface where there are problems, from the cornea, to the front surface of the lens. So, we are reliant on industry to provide us with constant research and development into better materials and coatings. This lecture covers many of the exciting advancements in materials.

### Learning Objectives:

- Understand the importance of newer and better materials
- Gain a basic understanding of GP polymers used in the market today
- Gain insight into the various surface treatments available to today's materials

### Outline:

- I. Intro with disclosures
- II. What is the GPLI?
  - a. Educational arm of CLMA
    - i. Free monthly webinars (archived)
    - ii. Online resources
      1. Vertex calculator
      2. GP material facts
      3. Coding and Billing
      4. Consumer facing ContactLensSafety.org
      5. Fitting resources
    - iii. Training for Cornea and Contact Lens residents
    - iv. Training for office staff

- III. What is the CLMA?
  - a. Independent laboratories and button manufacturers
  - b. Training consultants
  - c. How the GP industry funds marketing and education for GP lenses
    - i. Button tax- paid by laboratories- filtered back into unbranded education
    - ii. Tax also covers marketing for independent labs
- IV. GP materials
  - a. Basic parameters
    - i. Dk
    - ii. Wetting angle
    - iii. Refractive index
    - iv. Specific gravity
  - b. Advanced concepts
    - i. Wetting
      - 1. Amphiphilic nature of surface polymers
      - 2. Wear time required for proper wetting ~40 hours
      - 3. Wetting influenced by purification of front surface
        - a. Plasma treatment- not coating- purification process
        - b. If lens dries, plasma treatment eliminated
      - 4. Lathe speed can ruin a front surface
    - ii. Specific gravity can be used to influence fit of lens
    - iii. Index of refraction can be used to drive multifocal success
- V. Coatings
  - a. Currently one coating available- variant on polyethylene glycol (PEG).

- b. PEG is common hydrogel material- used in many medical applications
  - c. Hydrogel has low Dk- not a problem when used as a coating
  - d. PEG is biologically unsuited for a surface treatment in native state- would break up on front surface of lens
  - e. 0.03u thick- still exhibits improvement in lubricity at 0.01u thick
    - i. Empirical testing shows does not wear off
    - ii. Can strip off with PVA solutions
    - iii. Lenses must be shipped wet or coating will thin in months
  - f. Decreases binding of proteins and lipids
- VI. Industry news
- a. Hexafocon a is now off patent- will be available in generic in 2018
  - b. Wetting solution soon to come will replenish PEG coating