Heart *of* America
Eye Care Congress

Course Title: Epithelium-On, Oxygen-Enhanced Corneal Cross-Linking: Advancing Clinical Decision-Making, Early Intervention, and Co-Management in Keratoconus Care

Dr. Elise Kramer, OD, FAAO, FSLS, FBCLA

Course Description

This course reviews epithelium-on, oxygen-enhanced corneal cross-linking, focusing on keratoconus diagnosis, progression, treatment mechanisms, patient selection, and co-management strategies to improve clinical outcomes and preserve vision.

Learning Objectives (Expanded & COPE-Optimized)

At the conclusion of this course, participants will be able to identify keratoconus progression, explain cross-linking mechanisms, compare techniques, determine patient candidacy, and apply co-management strategies to optimize outcomes.

COPE Category

Contact Lenses (CL) under Clinical Optometry

Course Format

Lecture (Live CE)

Course Outline (1 Hour)

I. Introduction: The Evolving Landscape of Keratoconus Management (8–10 minutes)

- Overview of keratoconus as a progressive, degenerative corneal disorder characterized by stromal thinning and biomechanical instability
- Epidemiology and increasing recognition due to advancements in diagnostic technology

- Historical management paradigm: reliance on spectacles, contact lenses, and eventual corneal transplantation
- Transition to interventional care with cross-linking as a disease-modifying therapy
- Clinical implications of delayed diagnosis, including increased risk of visual morbidity and surgical intervention

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II. Diagnosis and Identification of Disease Progression (10 minutes)

- Clinical signs and symptoms:
    - Progressive myopia and irregular astigmatism
    - Decreased best-corrected visual acuity
    - Visual distortions such as glare, halos, and monocular diplopia
- Slit lamp findings and clinical indicators of ectasia
- Role of diagnostic imaging:
    - Corneal topography and tomography as essential tools
    - Identification of inferior steepening, asymmetry, and posterior elevation
    - Importance of pachymetry and epithelial thickness mapping
- Defining progression:
    - Increase in maximum keratometry (Kmax)
    - Changes in refractive error (myopic shift or astigmatism)
    - Corneal thinning over time
- Differentiating true keratoconus from pseudo-keratoconus or contact lens-induced corneal changes

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III. Mechanism of Action of Corneal Cross-Linking (10 minutes)

- Overview of cross-linking as a photochemical process designed to increase corneal rigidity
- Role of riboflavin (vitamin B2) as a photosensitizer
- Activation with UV-A light leading to formation of reactive oxygen species
- Induction of covalent bonds between collagen fibrils, enhancing biomechanical stability
- Critical role of oxygen in facilitating cross-linking reactions
- Impact of increased corneal stiffness on halting disease progression

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IV. Epithelium-On vs Epithelium-Off Cross-Linking (10 minutes)

- Traditional epithelium-off approach:
    - Removal of corneal epithelium to enhance riboflavin penetration
    - Established efficacy with long-term data
    - Associated drawbacks: patient discomfort, infection risk, delayed healing
- Epithelium-on (transepithelial) approach:
    - Preservation of epithelial layer
    - Reduced patient discomfort and faster recovery
- Role of oxygen-enhanced protocols:
    - Addressing limitations in riboflavin penetration and oxygen diffusion
    - Enhancing photochemical efficiency
- Current evidence and clinical considerations:
    - Variability in outcomes depending on protocol
    - Patient selection remains critical

V. Patient Selection and Timing of Intervention (10 minutes)

- Indications for cross-linking:
    - Progressive keratoconus
    - Post-refractive surgery ectasia
- Key criteria for intervention:
    - Documented progression over time
    - Corneal thickness considerations
    - Age-related risk factors (younger patients with higher progression risk)
- Importance of early intervention to prevent irreversible structural changes
- Clinical decision-making framework:
    - When to monitor vs when to refer
    - Balancing disease severity with risk of progression

VI. Co-Management and Clinical Integration (7–8 minutes)

- Role of the optometrist in the cross-linking pathway:
    - Early detection and screening

    - Patient education and counseling
    - Referral coordination with corneal specialists
- Pre-operative considerations:
    - Optimization of ocular surface disease (dry eye, MGD)
    - Importance of tear film stability for accurate diagnostics and outcomes
- Post-operative care:
    - Monitoring epithelial healing
    - Managing inflammation and discomfort
    - Timing of return to contact lens wear
- Long-term follow-up:
    - Monitoring for stability vs continued progression
    - Integration with specialty contact lens management

VII. Case-Based Applications and Clinical Pearls (5 minutes)

- Case examples illustrating:
    - Early detection and referral
    - Progressive disease identification
    - Post-treatment stabilization
- Practical clinical pearls:
    - Importance of baseline documentation
    - Recognizing subtle progression
    - Communicating urgency to patients

Instructional Methods

- Didactic lecture supported by clinical imaging and diagrams
- Case-based learning to reinforce clinical application
- Interactive discussion and audience Q&A

Disclosure Statement

This course is presented in accordance with COPE guidelines and is free of commercial bias. No specific products, proprietary technologies, or pharmaceutical agents will be promoted. All content is evidence-based and intended solely for educational purposes.