Corneal Staining and Infiltrative Keratitis: Is there a connection?

Lindsay A. Sicks, O.D.

Is corneal staining a risk factor for the development of infiltrative keratitis (IK) in contact lens wearers? Let’s examine what the literature has to say. Corneal staining (uptake of a dye by the corneal epithelium) is a phenomenon observed in 19 to 60 percent of hydrogel lens wearers. Corneal infiltrative events (CIEs) can range from tiny asymptomatic infiltrates to severe symptomatic events that can significantly disrupt patients’ lives.

Yes, there is an association.

- Two studies by Carnt, et al suggest an association between corneal staining and infiltrative events.
  - In the first study from 2002, cases of acute IK during extended wear (EW) of SiHy lenses were compared to a group of patients with no adverse events. Those with IK had greater corneal staining and one month and nine months of wear.
  - In the second study in 2007, eyes with solution toxicity (and associated corneal staining) were three times as likely to have developed infiltrates during the course of the study. Peroxide based solutions had the lowest rate of both staining and infiltrates.

- A 2007 study by Szczotka-Flynn, et al concluded that corneal staining and limbal redness may predict the subsequent development of an infiltrative event among 317 continuous wear contact lens patients over three years.

No, there is no conclusive association.

- A 2010 study also by Szczotka-Flynn, et al examined risk factors for CIEs during SiHy continuous wear. The study found that although approximately 53 percent of subjects had repeated episodes of corneal staining that were mild or greater, corneal staining was not associated with development of a CIE. Rather, the authors concluded that smoking and substantial lens bacterial bio burden were greater risk factors for CIE.
  - A subsequent review conducted in 2013 supports the idea that bacterial bio burden is the risk factor that best predicts development of CIE in SiHy lens wearers.

- Another 2010 study examined risk factors for contact lens complications in clinical practices across the United States. These authors found that high refractive error presented the highest overall risk for adverse events with contact lens wear and was associated with more cases of conjunctivitis and corneal staining, but not necessarily with inflammatory events. These findings are consistent with other studies citing high ametropia as a risk factor.

- A 2011 study of tear film, contact lens, and patient factors associated with corneal staining reported that low levels of corneal staining were common in contact lens wearers. However, the authors could not conclude “whether the staining observed had the propensity for pathogenicity.”

Conclusions
Many other recent studies have been conducted examining risk factors for infiltrative events in contact lens wearers of many types and modalities. Not all of these studies include corneal staining as a metric or examine the link between the presence of staining and the risk of CIEs. There certainly does not appear to be consensus regarding a clear relationship between corneal staining and infiltrative keratitis in the recent literature.

References:

Dr. Sicks received her Doctor of Optometry degree from the Illinois College of Optometry. She completed a cornea and contact lens residency program at Northeastern State University Oklahoma College of Optometry. Dr. Sicks is currently an assistant professor at the Illinois College of Optometry, where she participates in didactic, clinical, and research activities. Please close this browser window to return to the CLCS Newsletter