Insights on SICS and PATH
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SICS
SICS (solution-induced corneal staining) is a sign of cytotoxicity and solution hypersensitivity. In addition to corneal staining, it may have other signs and symptoms such as limbal redness and epithelial toxicity, which in turn may lead to symptoms of ocular surface discomfort or dryness\(^1\).\(^2\).

There is debate regarding the mechanism and clinical relevance of SICS. A study in Current Eye Research March 2014 by Gorbet, Peterson, McCanna, et al. evaluated corneal epithelial cell shedding and fluorescein staining with silicone hydrogel contact lenses and contact lens disinfecting solutions.\(^3\) One eye, the test eye, was exposed to a multipurpose contact lens solution previously shown to induce corneal staining (Renu® fresh™) and silicone hydrogel contact lens (balafilcon A). The other eye, the control eye, had a combination of balafilcon A soaked in a hydrogen peroxide care system (Clear Care®). Contact lenses were worn for two, four or six hours. Solution-induced corneal staining (SICS) was graded after lens removal and cells from the corneal surface and the contact lens were collected and analyzed.

In the test eye, maximum SICS was observed after two hours of lens wear. This was significantly reduced by four hours. In the test eye, there were significantly more cells collected after four hours of contact lens wear compared to the control eye. Confocal microscopy of fluorescein-stained cells revealed that fluorescein was present throughout the cell cytoplasm and was retained in the cells for many hours after recovery from the corneal surface. This study demonstrates that there is an association with a lens-solution combination and SICS as well as the transient nature of SICS.

PATH
Preservative-associated transient hyperfluorescence (PATH) is transient superficial corneal staining associated with the release of biocides from a contact lens. There are no symptoms, infection or inflammation of the cornea associated with PATH. PATH staining commences between 30 minutes to four hours after contact lens insertion, and resolves within six to eight hours.\(^4\).\(^5\)

Preservatives in contact lens solutions such as polyhexylmethyl biguanide (PHMB), Polyquad and Aldox are absorbed into all soft contact lens materials. The specific quantity of absorption is dependent on contact lens material, preservative and care product formulation.\(^5\).\(^7\) PATH is due to positively-charged molecules in contact lens solutions that are attracted negatively-charged fluorescein. The fluorescein and preservative bonding strength varies between the different types of preservatives. For example, fluorescein staining with Polyquad is weaker than fluorescein staining with PHMB.\(^5\)

It is important to critically evaluate the cornea in order to differentiate between transient corneal staining and corneal staining due to true pathology.

References:
Melissa Barnett, O.D., FAAO is a principal optometrist at the UC Davis Medical Center in Sacramento, where she performs primary and medical eye examinations and fits contact lenses, including specialty contact lenses, in addition to teaching optics and contact lenses to ophthalmology residents. She lectures and has been published on topics including dry eye, anterior segment disease, contact lenses, corneal collagen cross-linking and creating a healthy balance between work and home life for women in optometry. She is also a spokesperson for the California Optometric Association and has appeared on several television shows. In her spare time she enjoys cooking, yoga and spending time with her husband, Todd Erickson, also an optometrist, and two sons, Alex (7) and Drew (5).

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