Topping Off Happens: Disinfection Efficacy Matters

Gregory W. DeNaeyer, OD

The real-world disinfection efficacy of a multi-purpose contact lens solution can be affected by how it is used—and even by the contact lenses it is used with.

Microbial keratitis is a rare but serious complication of soft contact lens wear. After devastating outbreaks of multi-purpose contact lens solution-related Fusarium and Acanthamoeba keratitis in 2006 and 2007, the FDA launched in-depth investigations to indentify the causes and associated risk factors.

Certain multi-purpose solutions were linked to the outbreaks, but were not themselves contaminated; rather, in some circumstances, they failed to disinfect against pathogens introduced from the environment. In addition, patients’ failure to follow recommended disinfection practices was found to be a contributing factor in both outbreaks.

TIPPING OFF

A critical noncompliant patient behavior identified in these investigations was “tapping off,” in which, rather than emptying, rinsing, and drying their contact lens cases after each use, patients simply remove the lenses, adding just enough fresh multi-purpose solution to “top off” the case. In a recent survey of 100 soft contact lens wearers, over a quarter of participants reported occasional or frequent topping off. Many subjects were unaware of a contact lens case—results may not reflect the impact of lens storage in a lens case. Recent FDA-sponsored research, however, has looked specifically at interactions between contact lens materials and multi-purpose solutions, finding that some soft lenses will absorb some preservatives over time, thus diminishing the disinfectant concentration in the solution and reducing its efficacy against some microorganisms.

DISINFECTANT DIFFERENCES

Clavet and coworkers studied the effects of soaking six silicone hydrogel and two hydrogel lens types in a multi-purpose solution containing the disinfectant polyhexamethylene biguanide (PHMB, 0.0001%, 6-hour soak). Lens cases filled with the multi-purpose solution, but no lenses, served as controls. At intervals of 6, 12, 24, 72, and 168 hours, multi-purpose solution was analyzed for PHMB concentration and biocidal activity against Fusarium solani. Certain lens materials (balafilon A, etafilon A, and polymacon) absorbed the PHMB, significantly reducing its concentration and lowering the residual solutions’ efficacy against Fusarium.

A separate, similarly designed experiment also showed depletion of PHMB in the presence of certain lens materials (galafilon A, comfilcon A, balafilon A, polymacon, and etafilon A), and demonstrated a significant reduction in disinfecting efficacy against Staphylococcus aureus. Reusing and topping off a solution may reduce its antimicrobial efficacy in the presence of a lens.

In similar testing, however, soaking silicone hydrogel and hydrogel lenses in a solution containing the dual biocidal agents polyquaternium-1 (0.001%) and myristamidopropyl dimethyle (0.0005%) did not significantly reduce residual preservative levels or antimicrobial efficacy against S. aureus.

CLINICAL VALUE

Helping patients to be successful in contact lenses requires clear, repeated education about choosing the right lens care solution and using it properly. I always ask returning patients about their contact lens care; I make sure they are aware of the dangers of tapping off, and of differences in multi-purpose solutions.

Recommendating a multi-purpose solution and talking about proper lens care and multi-purpose solution use are important first steps. Reinforcing this discussion, as our practice does, with written instructions, gives patients a road map to successful and comfortable contact lens wear.

Gregory W. DeNaeyer, OD, practices at Arena Eye Surgeons, in Columbus, OH.

REFERENCES