

Scleral Lens Wettability with Biotrue® An In Vitro Pilot Study

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INTRO

A good wetting surface lens is crucial to preventing changes to the under surface of the eyelid as it blinks over the contact lens. A poor wetting surface will also cause dry patches that increase deposition of lipid and denatured proteins from the tears.¹ In a survey taken at the Global Specialty Lens Symposium in 2017, the top minor scleral lens complication reported was poor scleral lens wetting which 90.8% of practitioners documented to occur. Removing, cleaning and reapplying the scleral lens was the top treatment choice for practitioners followed by removing, cleaning, soaking and reapplying the scleral lens, artificial tears and rubbing the front surface of the lens with a plunger while still on eye.² Biotrue® multipurpose lens solution is approved for usage with soft contact lenses. However, Biotrue® has been also been anecdotally recommended by practitioners to enhance wettability of rigid gas permeables. The purpose of this study is to investigate the effect of Biotrue® scleral gas permeable contact lenses wettability.

METHODS

Ten scleral lenses (Optimum Extra, Contamac, Saffron Walden, England) were prepared by digitally rubbing both F1 and F2 surface for 20 seconds with Optimum by Lobob® Extra Strength Cleaner (Lobob Labs, San Jose, California). The lenses were then rinsed with Clear Care Plus® with Hydraglyde® (Alcon, Fort Worth Texas) for five seconds and soaked overnight at least six hours in the same solution. After treatment with Clear Care Plus®, lenses were separated into two study groups; group one: rinsed for 10 seconds with PuriLens® (The Lifestyle Company, Freehold NJ) and group two: rubbed for 20 seconds with Biotrue® and rinsed for 10 seconds with Biotrue®. Lens wettability for each group was evaluated under microscope at 10x magnification. Two drops of sterile saline solution (Addipak, Teleflex Medical, USA) were applied to the surface of each lens and evaporation time was recorded for both the initial and end point of evaporation (as determined by the presence of a tear fern).

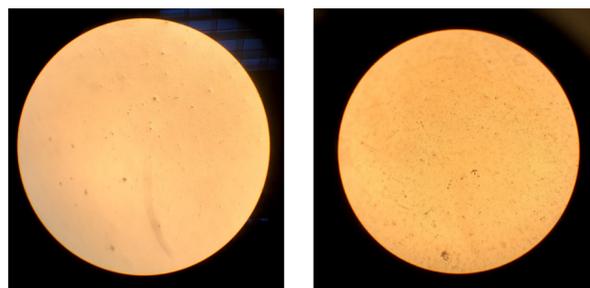


Figure 1: Initial point of evaporation and final point of evaporation featuring a complete tear fern.

RESULTS

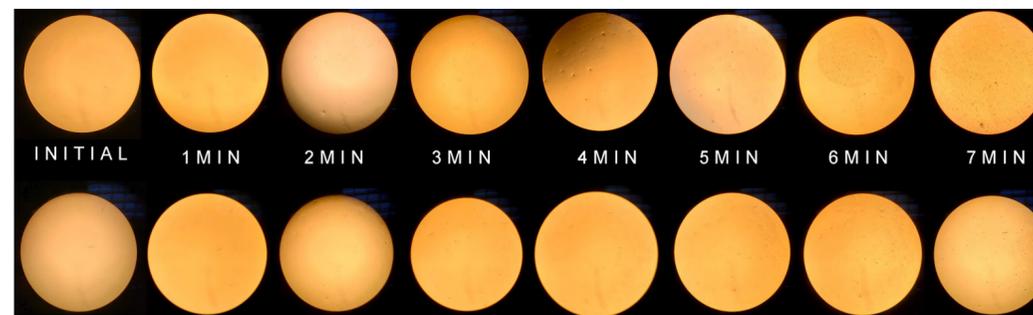


Figure 2: Minute by minute documentation of evaporation with Clear care alone® (top row) and Clear Care with Biotrue® (bottom row).

Initial Break Up



Figure 3: Initial evaporation time of Clear Care® with Biotrue® versus Clear Care® alone.

Final Breakup



Figure 4: Final evaporation time of Clear Care® with Biotrue® versus Clear Care® alone.

Data showed group two (Clear Care with Biotrue®) had a significantly longer mean initial evaporation times (189.48 seconds, SD=33.29; p=0.0021) compared to group one (152.32 seconds, SD=33.29). A longer mean final evaporation time was also measured for group 2 (393.52 seconds, SD=135.46; p=0.006) compared to group 1 (297.33 seconds, SD=97.97).

DISCUSSION

Hyaluronic acid (HA) is a polymer that is naturally found in the human body and has been detected in many ocular structures. Specifically, its role in the cornea has been shown to promote water retention and increase wettability of the corneal surface, with the ability to bind up to 1,000 times its weight in water.³ Furthermore, HA helps to stabilize the tear film and reduce symptoms of dry eye disease.⁴ As a result, HA has been utilized in a number of different products. Biotrue® is a commonly used multipurpose sterile, isotonic solution containing HA, surfactants, and disinfectants. Studies have shown its ability to effectively absorb into silicone hydrogel and hydrogel contact lenses during storage to be gradually released in the tear film over a 20 hour period.⁵ While Biotrue® has been anecdotally recommended by practitioners to enhance wettability of rigid gas permeable lenses, no data has been published on its effectiveness outside of soft contact lenses. Our results show a trend that scleral lenses treated with Biotrue® in addition to Clear Care® had longer evaporation rates on average for both initial and final break-up in in-vitro environments compared to Clear Care alone®. Greater evaporation times suggest patients may experience improved wettability of their scleral lenses with treatment with Biotrue®. Results from this pilot study are promising – the next steps would be to investigate how this may apply in vivo.

REFERENCES

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