The Effect of Thirty Day Continuous Wear of Ciba Focus Night & Day Contact Lenses on Conjunctival Goblet Cell Density

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Purpose
The introduction of silicone hydrogel lenses has created renewed patient and practitioner interest in thirty day continuous wear. Among the many safety issues the practitioner is concerned with is the effect the lens has on the ocular surface. The present study examined this by use of impression cytology taken over a 30 day period to assess ocular surface health based on conjunctival goblet cell density.

Questions
- What effect would 30 day continuous wear of Focus Night & Day have on the ocular surface as measured through the use of impression cytology?
- Would the silicone hydrogel affect the ocular surface because of mechanical differences from the conventional hydrogels?
- Would 30 day continuous wear lead to build up that would alter the ocular surface?

Methods
Twelve subjects, 13 females and 7 males with an average age of 31.7 years had baseline impression cytology performed prior to wearing Ciba Focus Night & Day (lotrafilcon A, 24% water) on a 30 day continuous wear schedule. The lenses were replaced every 30 days and impression cytology was performed at each replacement to assess goblet cell density.

Background
The authors have previously reported on the technique of impression cytology and its use in the evaluation of the effects of contact lens wear on the anterior segment. This study builds on our previous work by examining the effects of silicone hydrogel contact lenses (Ciba Focus Night & Day) on conjunctival goblet cell density.

Impression Cytology—Staining Procedure
- Goblet cells react to carbohydrates as they react with PAS while epithelial cells react with hematoxylin.
- Samples are fixed in 95% ethanol and stained with Periodic Acid Schiff reagent (PAS) and hematoxylin.

Staining Procedure
- Fix with 95% ethanol for 10 minutes
- Rinse in distilled water 3 minutes
- Immersion in Periodic acid 5 minutes
- Rinse in distilled water
- Immersion in Schiff’s reagent 5 minutes
- Develop to a pink color in tap water 5 minutes
- Stain with hematoxylin 1 minute
- Rinse in tap water
- Stain with hematoxylin 1 minute
- Rinse in tap water
- Decolorize with acid alcohol
- Rinse with tap water
- Develop to a blue color in saturated lithium carbonate
- Let slides dry
- Clear with ultraviolet immersion oil
- Mount cover slip

Assessment of Samples
- Each sample is examined by a trained naïve observer.
- The samples are analyzed with the Olympus microscope.
- A minimum of 200 cells per sample are counted on microscopic field.
- A random field is always used for counting of goblet cells.
- The observer performs all the cell counts.

Results
- Baseline goblet cell density was 4.26%. After one month a small decrease was observed, (3.75%). A further decline was observed in the second month to 2.4% and finally stabilization in month three to 2.5%. The maximum deviation on the sample was 2.5%. The decrease we observed was not statistically or clinically significant.

Change in Conjunctival Goblet Cell Density

Discussion
Conjunctival goblet cell density has been established as a useful indicator of the health of the anterior segment. In two previous studies1 we have examined the effects of hydrogel contact lens wear on conjunctival goblet cell density.

Previous Study—Conventional Replacement Daily Wear
- Baseline Goblet Cell Density 4.45% +/- 2.33%
- 30 lenses were replaced due to tear damage.

Previous Study—Two Week Disposable Daily Wear
- Baseline Goblet cell density was 5.25% +/- 1.50%
- None of the subjects experienced any irritation or tear loss, ocular surface complications or ocular infection.
- The goblet cell density showed no significant change over the course of the study.

Previous Studies—Conclusions
- The increase in goblet cells observed with conventional daily wear contact lenses is probably an adaptive response of the ocular surface to the irritation from a coated contact lens.
- It does not appear the hydrogel lenses reduce the mechanical irritation since disposable lenses worn for the same period have replaced every two weeks do not cause an increase in goblet cells.
- The most likely explanation of the goblet cell increase is a response of the ocular surface to the build up on a conventional replacement lens that does not occur with disposable lenses.

Current Study—Conclusions
- The 30 day continuous wear of these lenses on the ocular surface as measured by impression cytology is similar to that experienced in daily wear two week disposable conventional hydrogel lenses.

References

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