

Refractive Index and Hydrophobicity after Contact Lenses Wear

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Purpose:

The hydrophobicity and refractive index are important parameters of contact lenses (CL). In this work we studied the change in hydrophobicity and refractive index of different silicone hydrogel CL and a conventional disposable hydrogel lens after wear.

Methods:

Mean ages:
22.1 ± 4.2 years.
Interval:
Between 16 and 35 years.

- The hydrophobicity was determined through contact angle measurement using the advancing type technique with Milipore water in 34 lenses.

-The refractive indexes were measured with an automated refractometer (CLR 12-70, Index Instruments), in 72 lenses before and after the CL being worn.

- The material of the silicone hydrogel CL used in this work were Balafilcon A, Lotrafilcon A, Lotrafilcon B and the conventional disposable hydrogel was Etafilcon A.

- The experiments were performed after CL removal of patients from both sexes.

- Every patient used the conventional disposable hydrogel during 15 days and the silicone hydrogel CL during 1 month, one in each eye, in a daily wear schedule.

- The samples were measured at a room temperature of 21°C.

Results:

- The degree of hydrophobicity of the conventional hydrogel increases after wear and there are no significant differences in the hydrophobicity for the silicone hydrogel lenses (Figure 1).

- The refractive index increases for the conventional hydrogel lens after wear, the difference being statistically significant with $p < 0.01$ (Table 1). There are no significant differences between the measurements obtained on the refractive index for the silicone hydrogel contact lenses, before and after contact lenses wear.

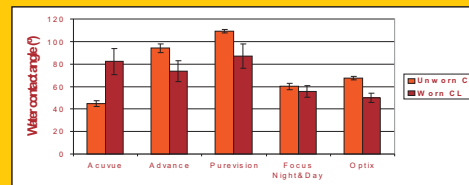


Figure 1. Plots of difference for the values of contact angles obtained for new and worn contact lenses

	Acuvue®	Acuvue® Advance™ with Hydraclear	Purevision™	Focus® Night & Day™	O2Optix™
Mean nn ± SD	1.3984 (± 0.0078)	1.4084 (± 0.0026)	1.4198 (± 0.0010)	1.4264 (± 0.0008)	1.4221 (± 0.010)
Mean nu ± SD	1.4102 (± 0.0018)	1.4088 (± 0.0016)	1.4200 (± 0.0009)	1.4265 (± 0.0005)	1.4220 (± 0.0014)
Sig (2-tailed)	0.000	0.696	0.771	0.690	0.798
Water content	58	47	36	24	33
Material	Etafilcon A	Galyfilcon A	Balafilcon A	Lotrafilcon A	Lotrafilcon B

Table 1. Refractive index for the different lens materials measured before (nn) and after (nu) contact lenses being used.

Conclusions

Only conventional hydrogel CL, the one with the greater water content, exhibited alterations in refractive index and hydrophobicity after being worn. The changes in these properties are probably due to the presence of a biofilm produced by the tear film(1). Since the refractive index is function of water content, it's increase must be due to dehydration of CL due to the presence of the biofilm.

(1)Ionnis Tranoudis, Nathan Efron, Contact Lens &Anterior Eye, 27 (2004) 193-208.