



Apparent Sympathetic Response of Contralateral Non Lens Wearing Eyes After Overnight Lens Wear In The Fellow Eye



Desmond Fonn, R enee du Toit, Trefford Simpson, Ping Situ, Jose Vega, *Robin Chalmers

Centre for Contact Lens Research, School of Optometry, University of Waterloo, Canada; *CIBA VISION

Introduction

When contact lenses are worn on one eye different sympathetic responses have been observed in the contralateral, non lens wearing eye.

In response to a *rigid* lens worn in one eye only:

? Mandell, Harris, and El Hage observed corneal swelling in both eyes

? Sarver noted peripheral corneal staining in both eyes

and when a *soft* lens was worn in one eye only:

? Parrish measured increased oxygen consumption in both eyes after lens removal

? However El Hage and Efron found no accompanying increase in corneal thickness in the contralateral eye

Purpose

To compare central corneal swelling and light scatter after 8 hours of sleep in eyes wearing :

? an experimental high Dk hydrogel lens (HiDk),

? a lower Dk hydrogel lens (LoDk) and

? non lens wear (control)

Methods

Table 1: Participants

? 20 Participants: 10 females 10 males

? Age 26.8 ? 7.5 years

? No history of contact lens wear.

? No ocular or systemic diseases, no topical or systemic medications

	Right Eyes	Left Eyes
Keratometry (horizontal) D	42.98 ? 1.29	43.07 ? 1.30
Keratometry (vertical) D	43.56 ? 1.35	43.85 ? 1.48
Autorefractor (sphere) D	-1.36 ? 1.25	-1.30 ? 1.36
Autorefractor (cylinder) D	-0.59 ? 0.30	-0.73 ? 0.70
Corneal thickness (mm)	0.54 ? 0.02	0.54 ? 0.02

Table 2: Lenses

Lens Material	Water Content(%)	BVP (D)	Diam. (mm)	Dk value	Base Curve (mm)
Lotrafilcon A	24	-3.00	14.0	140x10 ⁻¹¹	8.8
HiDk					
Etafilcon A	58	-3.00	14.0	28.0x10 ⁻¹¹	8.8
LoDK					

Table 3: Instrumentation

Variable	Instrument
Corneal thickness	modified electronic optical pachometer on a Zeiss biomicroscope
Forward light scatter	measured psychophysically with the Van den Berg Straylightmeter

Procedures

? This was a randomised double blind study where the lenses were worn on two different nights.

? Participants wore lenses overnight in their right eyes only; left eyes served as the control.

? Baseline measurements were taken at 4 p.m.

? Participants slept for 8 hours from 11 p.m. and were awakened at 7 a.m.

? Corneal thickness and light scatter were measured immediately following lens removal after waking and every 20 minutes thereafter for 3 hours.

? The data were analysed using repeated measures ANOVA.

? HiDk wearing eyes, LoDk wearing eyes and control eyes were compared over time.

? Post hoc paired t-tests were performed and significance levels were Bonferroni corrected.

Results

Corneal Swelling

? Corneal swelling in the eye induced by the LoDk lens was significantly higher than with the HiDk lens (paired t-tests: p<0.001): Figures 1 and 2; table 4.

? The swelling of the control eye paired with the LoDk lens was significantly higher, than that of the control eye paired with the HiDk lens (paired t-tests: p=0.0015): Figure 3, table 4.

? Sixteen participants showed greater corneal swelling in the control eye on the night testing the eye that was paired with the LoDk lens as compared to 2 participants who had less swelling in the contralateral eye when the LoDk lens was tested: Figure 4.

Table 4: Corneal Swelling and Increase in Light Scatter (Mean?sem)

	HiDk	HiDk Control	LoDk	LoDk Control
% Swelling	2.70?0.42	1.44?0.20	8.64?0.63	2.34?0.28
% ? Light Scatter	9.55?2.44	5.58?1.88	13.8?3.00	6.52?2.09

Figure 1: Overnight Swelling and Deswelling Response: LoDk and Control Eyes (Mean?sem)

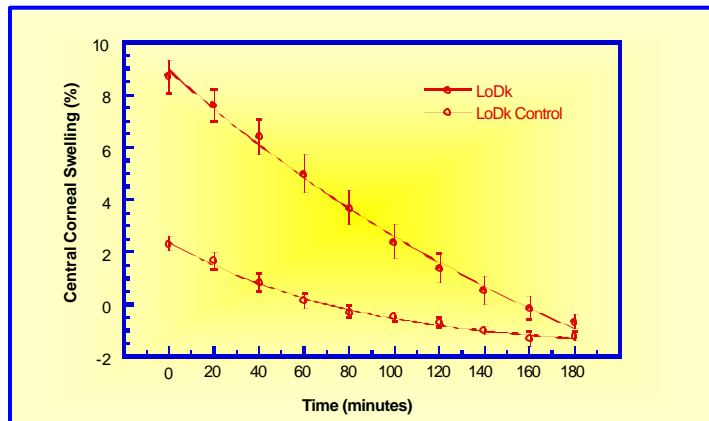


Figure 2: Overnight Swelling and Deswelling Response: HiDk And Control Eyes (Mean?sem)

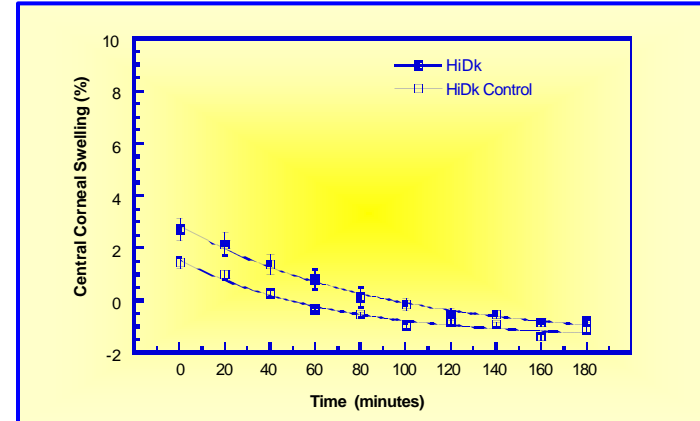


Figure 3: Overnight Swelling and Deswelling Response: LoDk Control and HiDk Control Eyes (Mean?sem)

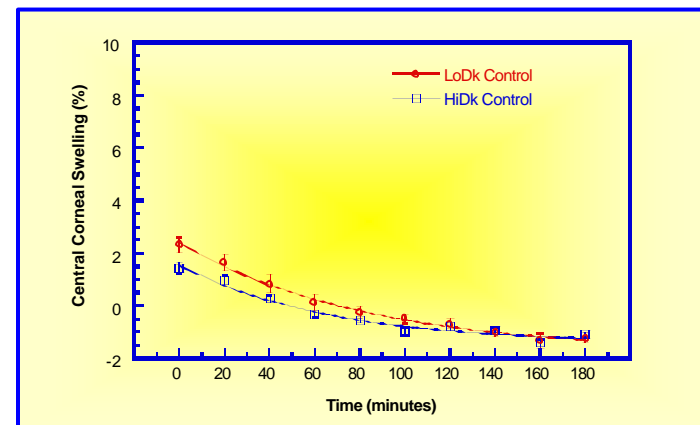
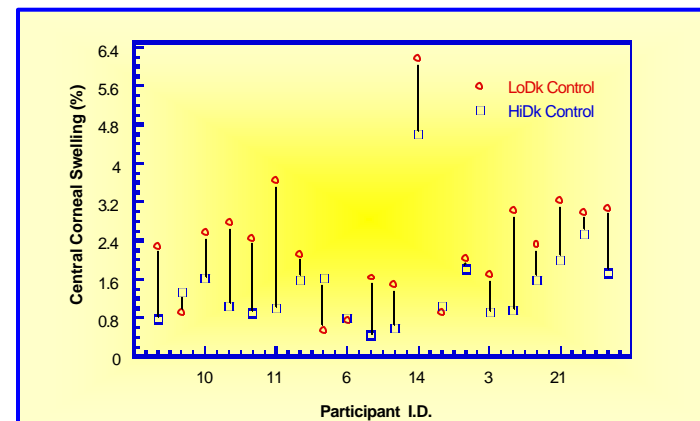


Figure 4: Individual Contralateral Swelling Response (Mean?sem)

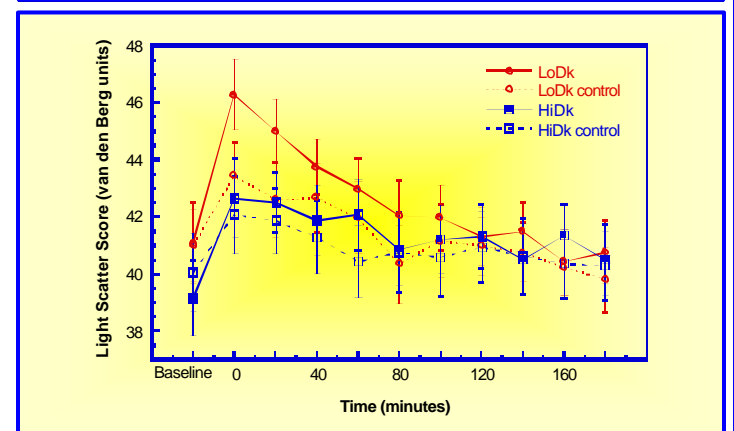


Light Scatter

? The light scatter scores of the LoDk eyes were significantly higher than the HiDk at lens removal and up till 40 minutes (paired t-tests all p<0.05).

? The LoDk controls showed the same trend as corneal swelling, i.e. more light scatter than the HiDk control at lens removal and up to 60 minutes though the difference was not statistically significant (paired t-test p=0.24).

Figure 5: Light Scatter HiDk, LoDk and Control Eyes (Mean?sem)



Conclusions

To a degree, corneal swelling and light scatter in the contralateral control eyes appears to be yoked with the swelling and scatter of the fellow lens wearing eyes. Because the same apparent effect was demonstrated by two different methodologies, this may reflect either an unusual sampling coincidence or a real though unexplained sympathetic physiological response.

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Acknowledgements

*This work was supported by a grant from CIBA VISION Corporation, Duluth, Georgia