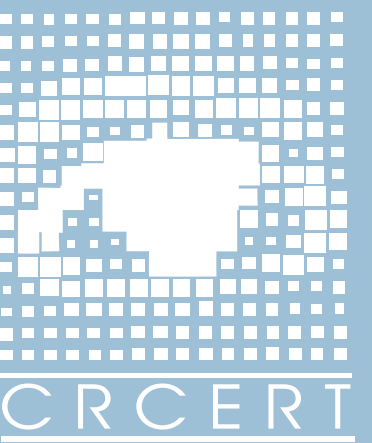


# Contact Lens - Ocular Surface Interactions in Superior Epithelial Arcuate Lesions (SEALS)

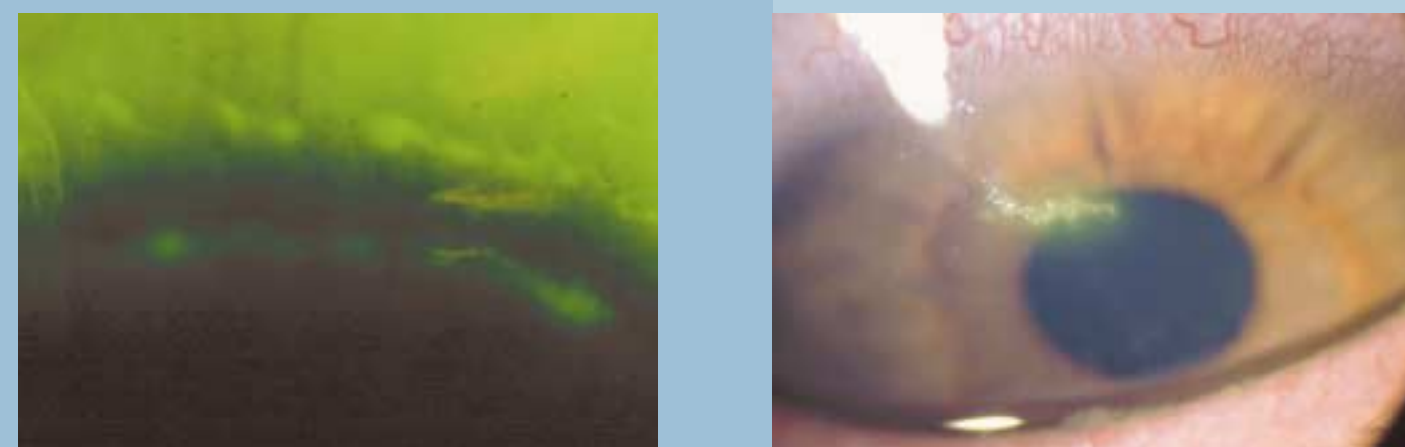


Nicole O'Hare, Fiona Stapleton, Thomas Naduvilath, Isabelle Jalbert, Deborah F. Sweeney, Brien A. Holden  
Cornea and Contact Lens Research Unit, School of Optometry, Cooperative Research Centre for Eye Research and Technology, University of New South Wales, Sydney, Australia

## Purpose

Determine ocular and lens surface and fitting factors associated with superior epithelial arcuate lesions (SEALS) in high Dk soft extended wear (EW).

## Method



### SEALs: Signs and Symptoms

- Full thickness epithelial split.
- Typically between 10 and 2 o'clock and within 3mm of limbus.
- Usually arcuate although can be linear.
- "Heaping" of epithelial tissue often present (white, raised, jagged appearance).
- Underlying diffuse infiltration may be observed.
- Usually asymptomatic but sometimes "foreign body" sensation reported.

### STUDY DESIGN

- Retrospective analysis.
- Subjects matched for age, sex, spectacle refraction, duration of high Dk soft EW, prescribed wearing schedule (6 or 30 nights) and lens type.
- Variables compared:
  - Subject characteristics (baseline keratometry, ethnicity)\*
  - Lens surface characteristics (wettability, back surface "film", back surface debris, mucin balls)\*\*
  - Lens performance (tightness, primary gaze movement)\*\*

\*At baseline only

\*\*Visits prior to event for cases vs control and visits at time of event for cases

### Contact lens cytology

- Performed at follow up visit (not during event)
- Habitual lenses removed directly from the cornea
- Epithelial cells harvested from the back surface of the lens by irrigation
- Irrigated cells and lens stained with 2mg/ml Hoescht 33342 stain with 10mg/ml Propidium Iodine for 10 mins at 35°
- Cells filtered, mounted and viewed under fluorescent microscopy
- Cell counts and viability compared between cases and controls for total counts, loosely adherent cells (collected from the lens irrigation) and tightly bound cells (those remaining attached to the lens)

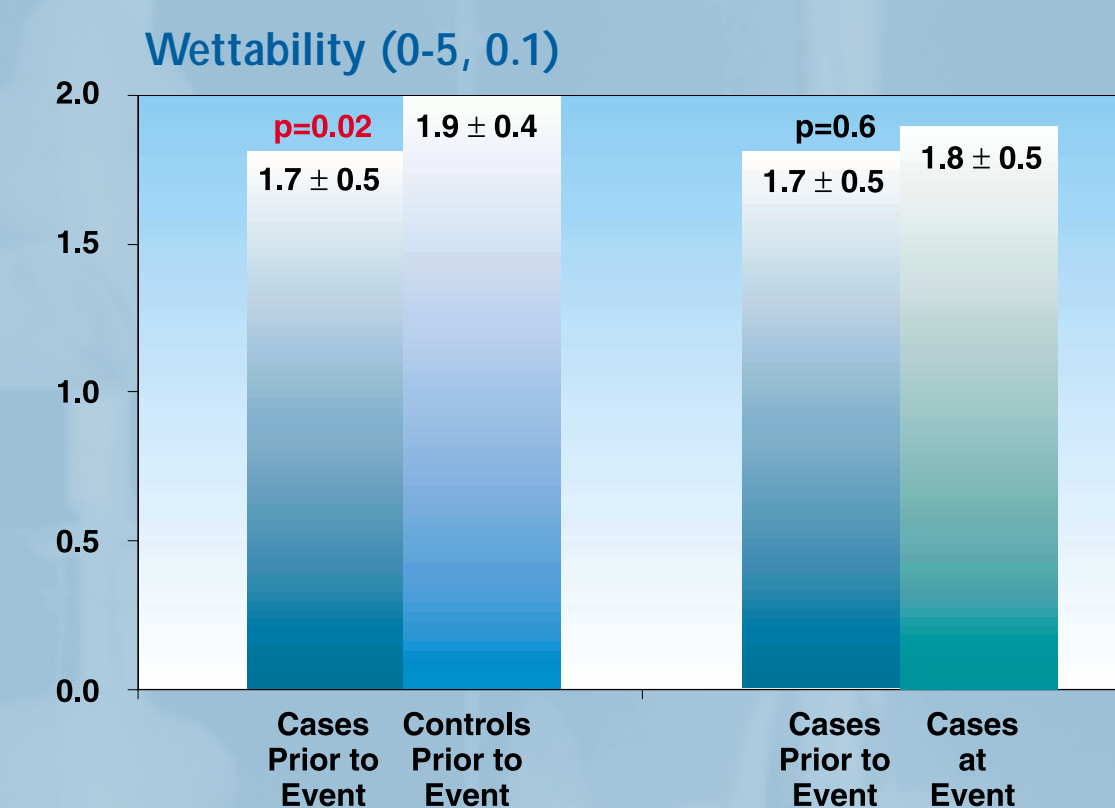
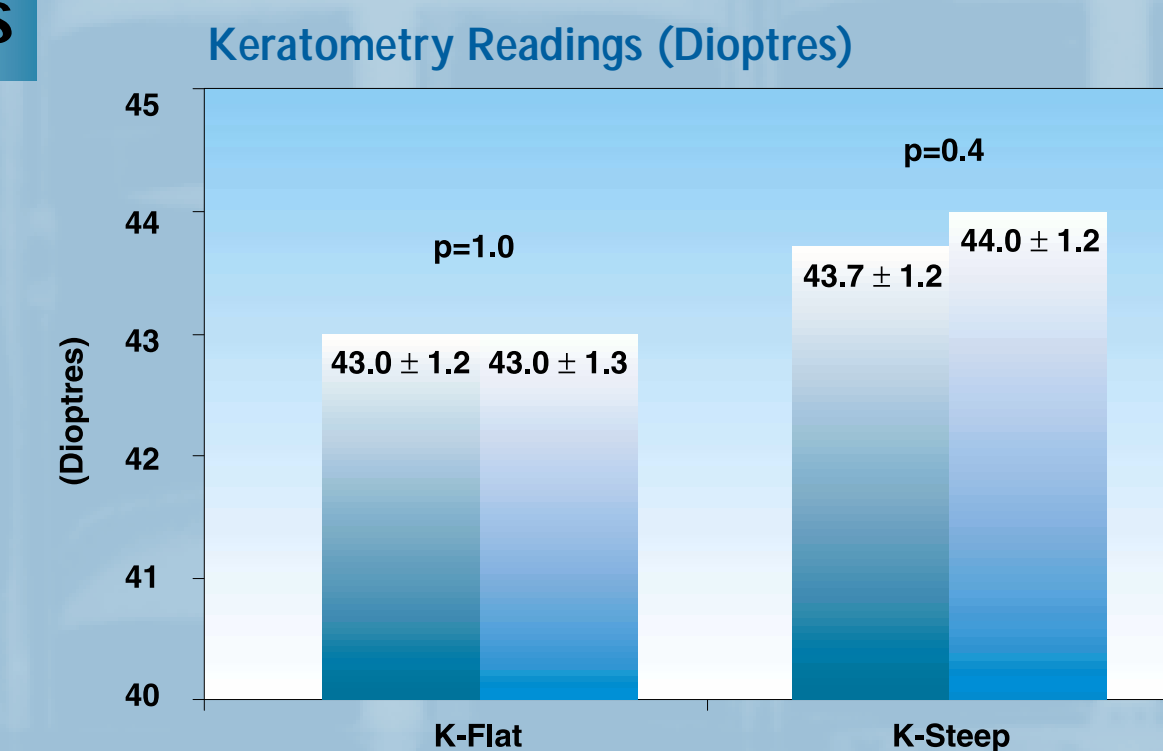
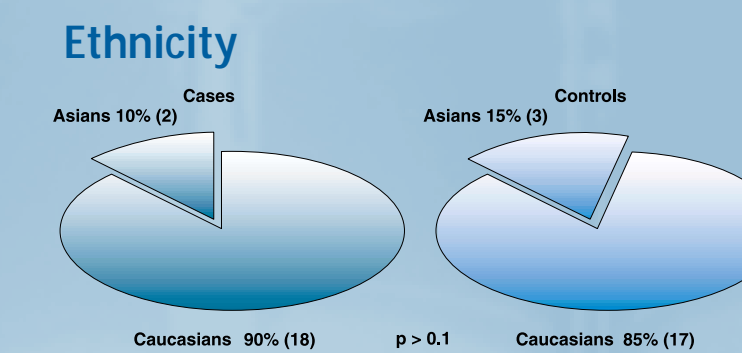
LENSES		
	Type A	Type B
Material	balafilcon A	lotrafilcon A
Water Content (%)	35	24
Dk (Barrers)	110	140
Modulus (MPa)	1.1	1.2

## Results

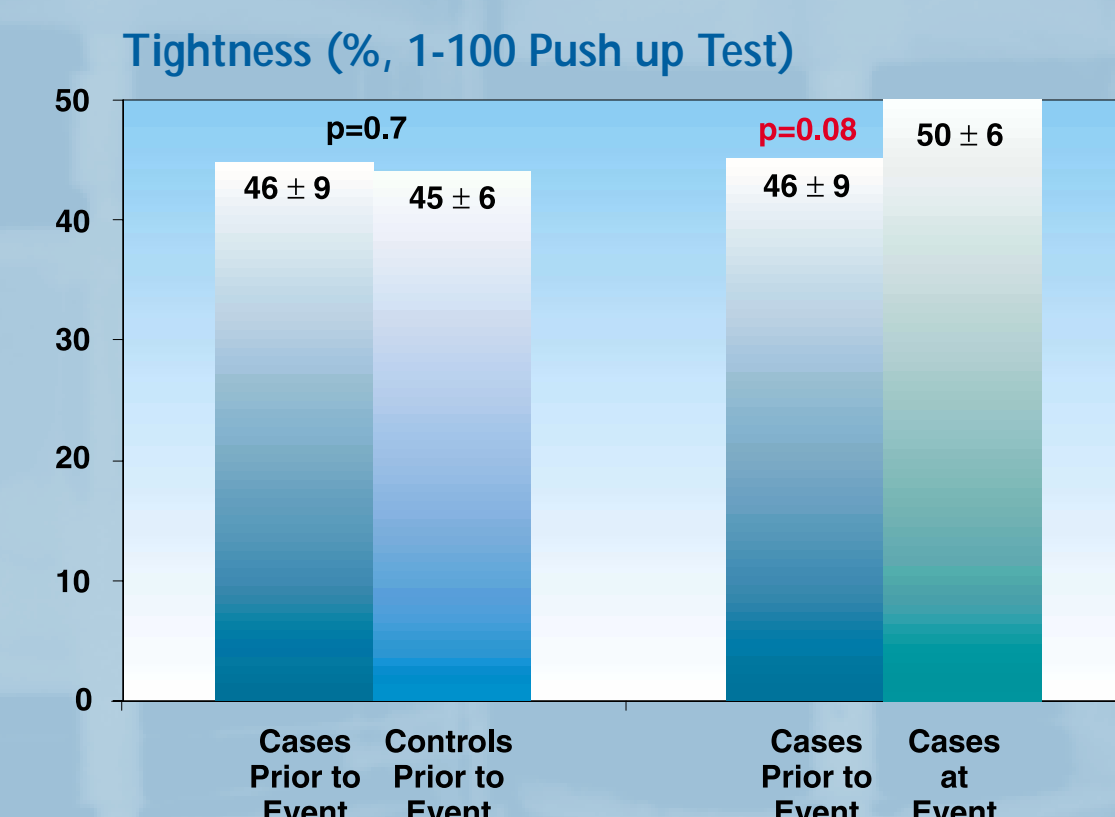
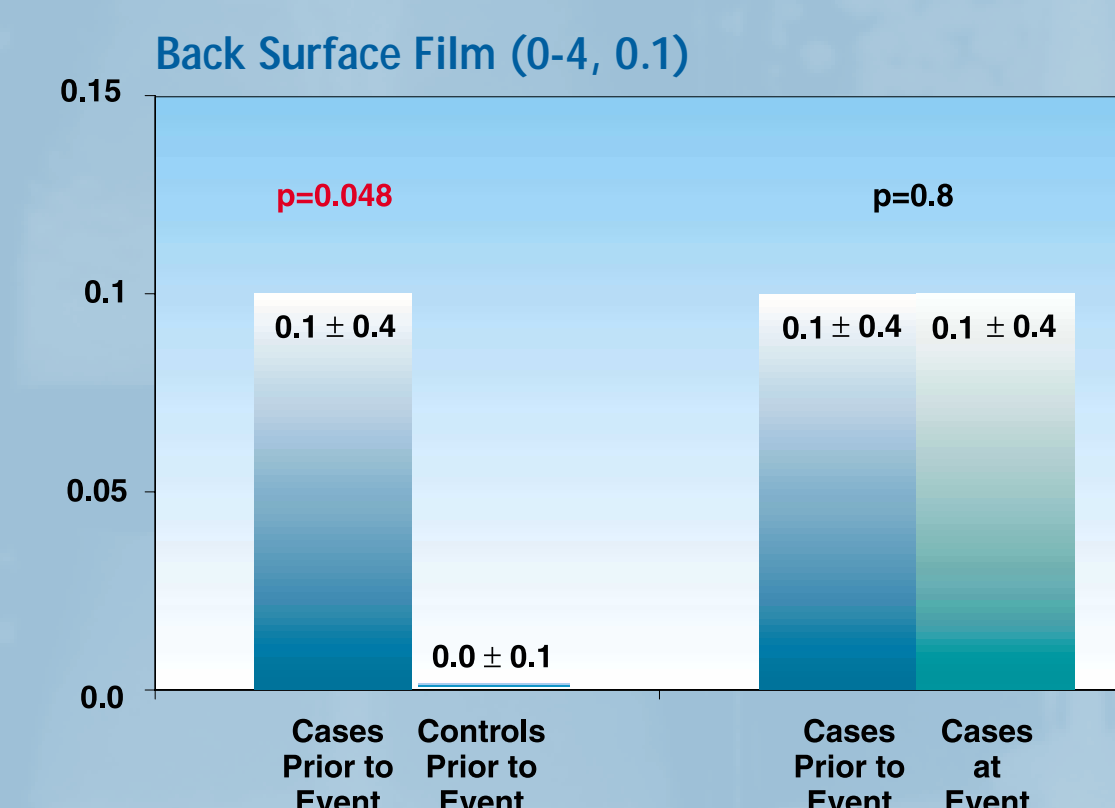
SUBJECTS			
	Cases (n=20)	Controls (n=20)	p-Value
Age (years)	29 ± 5	30 ± 4	0.6
Sex (M:F)	10:10	10:10	1.0
Rx-Sphere (DS) - Cyl (DC)	-2.71 ± 1.07 -0.26 ± 0.26	-2.66 ± 1.16 -0.34 ± 0.27	0.9 0.4
Length of EW (mths)	19 ± 7	19 ± 6	0.7
Wear Schedule (6N:30N)	6:14	6:14	1.0

### Subject Characteristics

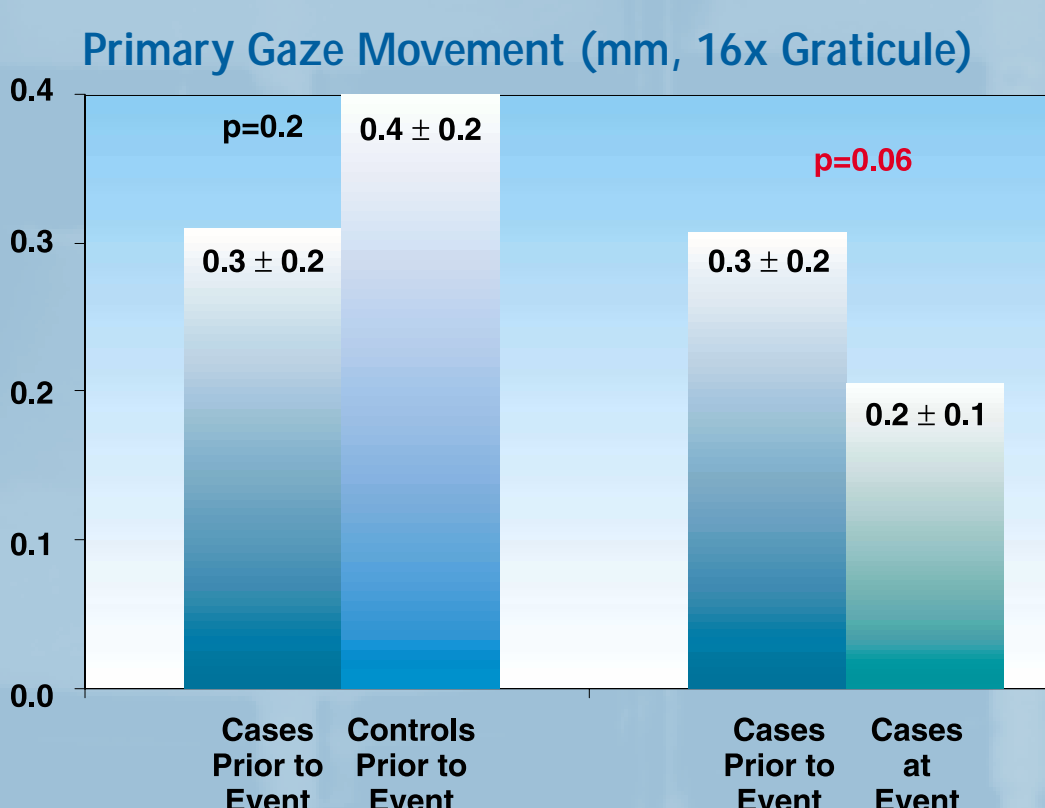
- Cases at event
- Cases prior to event
- Controls



### Surface Characteristics



### Lens Performance



### Contact Lens Cytology



Total (live and dead) cell counts			
	Residual + loosely adherent cell count	Tightly adherent cell count	Loosely adherent cell count
Cases (n=6)	22 (6-42)	19 (2-42)	3 (0-8)
Controls (n=15)	7 (3-21)	5 (0-21)	1 (0-5)
p value	0.006	0.045	0.205

Mann Whitney test used for comparison between the 2 groups.

## Discussion

### Summary

- Baseline:
  - No differences in keratometry or ethnicity
- Cases vs control prior to event:
  - Lower wettability
  - Higher back surface "film" deposits
- Cases at time of event vs prior to event:
  - Tighter fitting lenses
  - Less primary gaze movement
- Contact Lens Cytology:
  - Higher numbers of corneal epithelial cells recovered from cases compared to controls

Steep corneas<sup>1</sup> and Asians<sup>2</sup> were not predisposed to SEALs. However, to test ethnicity a larger sample size would be required as only 6% of wearers from the total study population were Asian.

The recovery of more cells from lenses worn by cases indicates greater interaction between the back surface of the lens and the epithelium in these subjects.

Mechanical interaction would be exacerbated by the higher modulus of these high Dk soft lens materials.

## Conclusion

Subjects with poorer wettability and tighter fitting lenses are more likely to develop SEALs in high Dk soft lens EW. These results suggest the hypothesis that poor wettability and tight fitting lenses lead to greater "shear" forces that disrupt the ocular surface in the superior cornea in high Dk EW.

## References

- Kline, LN and Deluca, TI (1977). J Am Optom Assoc, 48:372-376.
- Josephson, JE (1978a). J Am Optom Assoc, 49:445.
- Josephson, JE (1978b). J Am Optom Assoc, 49:869-870.
- Young, G and Mirejovsky, D (1993). ICLC, 20:177-180

## Acknowledgements

This work was supported by the Australian Federal Government through the Cooperative Research Centres programme, CIBA Vision and Bausch & Lomb. The authors would also like to acknowledge the assistance of i-media communications @ CRCERT and Jason Kasses.