

2015

## The Effect of Two Weeks and Twenty-Four Hours Soft Contact Lens Cessation Times on Corneal Refractive Surgery Outcomes

Aoife Lloyd McKernan

*Technological University Dublin, [aoifemarie.lloyd@tudublin.ie](mailto:aoifemarie.lloyd@tudublin.ie)*

Luisa Simo Mannion

*Plymouth University*

Veronica O'Dwyer

*Technological University Dublin, [veronica.odwyer@tudublin.ie](mailto:veronica.odwyer@tudublin.ie)*

Follow this and additional works at: <https://arrow.tudublin.ie/scschphyot>



Part of the [Physics Commons](#)

---

### Recommended Citation

Lloyd McKernan, A, Simo Mannion, L. & O'Dwyer V. (2015) The effect of two weeks and twenty-four hours soft contact lens cessation times on corneal refractive surgery outcomes. Poster presentation, *European Academy of Optometry*. Budapest, May 2015.

This Presentation is brought to you for free and open access by the School of Physics, Clinical and Optometric Science at ARROW@TU Dublin. It has been accepted for inclusion in Other Resources by an authorized administrator of ARROW@TU Dublin. For more information, please contact [arrow.admin@tudublin.ie](mailto:arrow.admin@tudublin.ie), [aisling.coyne@tudublin.ie](mailto:aisling.coyne@tudublin.ie), [vera.kilshaw@tudublin.ie](mailto:vera.kilshaw@tudublin.ie).



# The effect of two weeks and twenty-four hours soft contact lens cessation times on corneal refractive surgery outcomes

Aoife Lloyd McKernan<sup>1</sup>, Luisa Simo Manion<sup>2</sup>, Veronica O'Dwyer<sup>1</sup>

<sup>1</sup> Dublin Institute of Technology, <sup>2</sup> University of Plymouth

## INTRODUCTION

Soft contact lens (SCL) wear can reduce accuracy of pre-operative corneal measurements and outcomes of corneal refractive surgery (CRS)<sup>1,2</sup>. Hypoxia induced by over-wear of SCLs can result in reduced corneal metabolism<sup>1,2</sup> and alterations to endothelial structure resulting in increased light scatter and less light transmission<sup>3,4</sup>. This may affect corneal healing following CRS. The time required for resolution of SCL-induced corneal changes can vary and can be longer than 2 weeks<sup>5,6,7</sup>. Despite this, prior to CRS, a standard SCL cessation time is advised for all patients. This cessation time varies according to governing bodies. United States Food and Drug Administration (FDA) guidelines recommend that SCL be left out for at least 2 weeks prior to initial consultation<sup>8</sup>. Whereas, the Royal College of Ophthalmologists in the United Kingdom recommend removing SCL for 1 day before CRS<sup>9</sup>. Short SCL cessation times prior to CRS may be insufficient for resolution of SCL-induced corneal changes.

## HYPOTHESIS

Visual and refractive CRS outcomes would be worse in a SCL group compared to a non-contact lens (NCL) group and worse in a SCL group who ceased SCL wear for 24 hours when compared to those who ceased SCL wear for two weeks prior to examination and treatment.

Figure 1. A: pre-operative topography profile. B: topography profile following CRS for myopia.

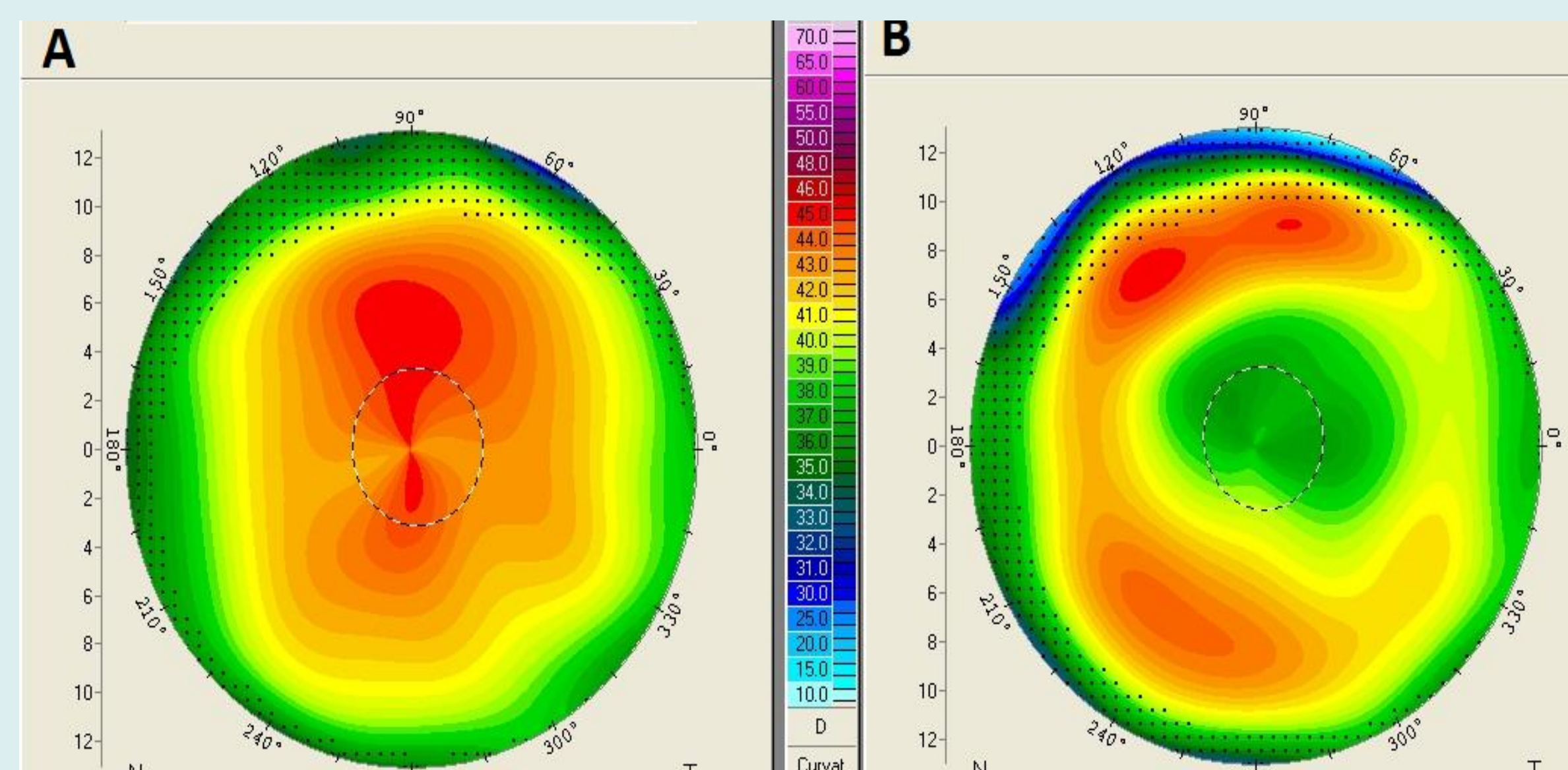


Table 1.

	LASIK			LASEK/PRK		
	SCL (n = 23)	NCL (n = 23)	Sig	SCL (n = 22)	NCL (n = 22)	Sig
<b>2 weeks cessation group</b>						
LogMAR BCSVA	-0.13 ± 0.06	-0.13 ± 0.04	0.19	-0.13 ± 0.05	-0.10 ± 0.07	0.25
MSE (D)	-3.97 ± 1.84	-2.75 ± 1.66	0.01	-3.98 ± 1.43	-2.95 ± 1.33	0.02
Age (years)	32.6 ± 7.50	36.0 ± 9.60	0.16	31.4 ± 8.0	37.2 ± 11.0	0.22
<b>24 hours cessation group</b>						
	SCL (n = 33)	NCL (n = 39)	Sig	SCL (n = 16)	NCL (n = 10)	Sig
LogMAR BCSVA	-0.11 ± 0.02	-0.10 ± 0.03	0.14	-0.10 ± 0.03	-0.10 ± 0.01	0.74
MSE (D)	-3.78 ± 1.46	-2.57 ± 1.46	0.001	-3.73 ± 1.78	-3.29 ± 1.38	0.51
Age (years)	30.2 ± 8.25	34.8 ± 8.85	0.05	28.0 ± 5.23	30.9 ± 8.08	0.14

## METHODS

CRS outcomes of dominant eyes for two groups of previous full-time SCL wearing patients were analysed retrospectively; those who ceased SCL wear for two weeks (n = 45) and twenty four hours (n = 49) prior to examination and treatment. In both groups results were compared to a NCL control group (2 weeks NCL group n = 45; 24 hours NCL group n = 49).

LASIK and PRK/LASEK outcomes at one, three and six months post-operative visits were assessed for efficacy (unaided distance visual acuity (UDVA) and residual refractive error), predictability (number of eyes within ± 0.25D and ± 0.50D of desired refractive outcome) and safety.

SPSS 22 was used for statistical analysis. Normality for continuous data were assessed using the Shapiro-Wilks method. Two-way ANOVA parametric testing was used for comparisons of groups. P < 0.05 was considered statistically significant.

## RESULTS

The demographics of the groups tested can be seen in Table 1. There was a trend towards superior CRS outcomes for efficacy, predictability and safety in the two weeks SCL cessation group compared to NCL group. These results were significantly better for LogMAR UDVA in the SCL group and were maintained to the six month post-operative visit (LASIK p = 0.03, LASEK/PRK p = 0.03; Table 2).

Table 2: Six month post-operative VA and refraction parameters for the 2 weeks SCL cessation group

	LASIK			LASEK/PRK		
	SCL (n = 19)	NCL (n = 16)	Sig	SCL (n = 18)	NCL (n = 18)	Sig
<b>Efficacy</b>						
UDVA (mean ± SD) LogMAR	-0.10 ± 0.10	-0.06 ± 0.07	0.03	-0.10 ± 0.08	-0.04 ± 0.08	0.03
Efficacy index	97%	98%		98%	97%	
0.3, < 6/12 n (%)	0	0		0	0	
< 0.3, > 6/12 n (%)	19 (83%)	16 (70%)	0.13	18 (82%)	18 (82%)	0.10
< 0.0, > 6/6 n (%)	17 (74%)	12 (52%)		16 (73%)	15 (68%)	
< -0.1, > 6/5 n (%)	14 (61%)	9 (39%)		14 (64%)	6 (27%)	
<b>Predictability</b>						
Within ± 0.25D	14 (61%)	9 (39%)		8 (36%)	7 (32%)	
Within ± 0.50D	18 (78%)	13 (56.5%)	0.92	10 (45.5%)	11 (50%)	0.71
Greater than ± 0.50D	1 (4%)	3 (13%)		6 (27%)	4 (18%)	
<b>Safety</b>						
Loss 1 line VA	4(21%)	6(37.5%)	0.11	3(17%)	9(50%)	0.25
Loss 2 or more lines VA	4(21%)	6(37.5%)		2(11%)	0(0%)	

## RESULTS

These findings were reiterated in the 24 hours SCL cessation group where the trend towards superior CRS outcomes for efficacy, predictability and safety in the SCL group compared to the NCL group was continued. UDVA efficacy outcomes following LASEK/PRK were significantly better in the SCL group at the six month post-operative visit (p = 0.03, Table 3).

Figure 2. Efficacy index for the 2 weeks SCL cessation group.

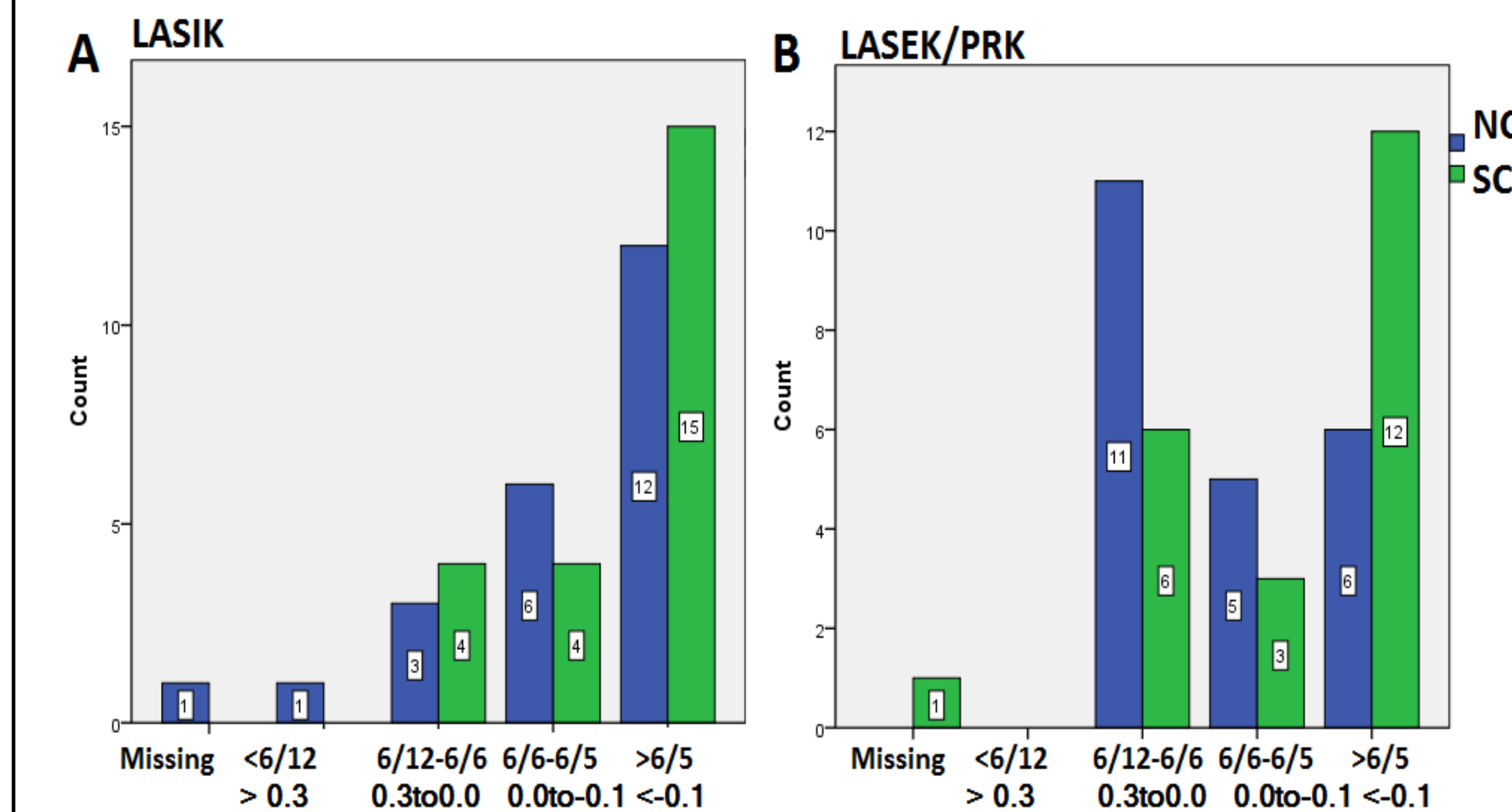


Table 3: Six month post-operative VA and refraction parameters for the 24 hours SCL cessation group

	LASIK			LASEK/PRK		
	SCL (n = 17)	NCL (n = 20)	Sig	SCL (n = 7)	NCL (n = 6)	Sig
<b>Efficacy</b>						
UDVA (mean ± SD) LogMAR	-0.06 ± 0.09	-0.04 ± 0.10	0.53	-0.11 ± 0.03	-0.04 ± 0.07	0.03
Efficacy index	98%	97%		100%	97%	
> 0.3, < 6/12 n (%)	0	0		0	0	
< 0.3, > 6/12 n (%)	3 (9.1%)	4 (10.3%)	0.74	0	2 (20%)	0.14
< 0.0, > 6/6 n (%)	2 (6.1%)	5 (12.8%)		0	1 (10%)	
< -0.1, > 6/5 n (%)	12 (36.4%)	11 (28.2%)		7 (43.8%)	3 (30%)	
<b>Predictability</b>						
Within ± 0.25D	10 (30.3%)	17 (43.6%)		5 (31.3%)	3 (30%)	
Within ± 0.50D	2 (6.1%)	2 (5.1%)	0.23	1 (6.3%)	2 (20%)	0.69
Greater than ± 0.50D	5 (15.2%)	1 (2.6%)		1 (6.3%)	1 (10%)	
<b>Safety</b>						
Loss of 2 or more lines	2 (6.1%)	2 (5.1%)		0	0	
Loss of 1 line	4 (12.1%)	4 (10.3%)		0	3 (30%)	
Maintain VA or loss < 1 line	9 (27.3%)	10 (25.6%)	0.76	5 (31.3%)	3 (30%)	0.17
Gain of 1 line	1 (3%)	4 (10.3%)		1 (6.3%)	0	
Gain of 2 or more lines	1 (3%)	0		1 (6.3%)	0	

## CONCLUSION

Previous SCL wear did not negatively impact on the outcomes of CRS, and SCL cessation times of 2 weeks and 24 hours did not result in negative outcomes compared to a NCL control group.

While these results were statistically significant, the number of letters difference in UDVA between the SCL and NCL groups was low. Therefore one cannot conclude that these results are clinically significant, as the standard uncertainty value for visual acuity outlined in the International Standards Organisation guidelines is two letters of Snellen VA (0.04 LogMAR), with a 95% confidence level of 4 letters<sup>10</sup>.

It is likely that the SCL wearers had previously adapted to some under-correction of astigmatism in their SCLs and to the increased surface irregularity with SCL wear<sup>11</sup>. Therefore previous SCL wears may have coped with the flatter topography profile following CRS (Figure 1) and post-operative haze<sup>12</sup>. However, these results are surprising when one considers the effect of the larger image size on VA in the NCL group following CRS. One would expect this would improve VA in this group compared to the SCL group who were accustomed to the larger image size in SCLs, compared to spectacle lenses pre-operatively<sup>13</sup>.

## Acknowledgements

The staff and ophthalmologists at Eye Laser Ireland and Ultralase Ireland.

## References

- Nieuwendaal, C., Odenthal, M., Kok, J., Venema, H., Oosting, J., Riemslag, F. & Kijlstra, A. 1994. Morphology and function of the corneal endothelium after long-term contact lens wear. *Investigative Ophthalmology and Visual Science*, 35, 3071-3077.
- Liesegang, T. 2002. Physiologic Changes of the Cornea with Contact Lens Wear. *Contact Lens and Anterior Eye*, 28, 12-27
- Mccally, R., Freund, D., Zorn, A., Bonney-Ray, J., Grebe, R., De La Cruz, Z. & Green, W. 2007. Light-scattering and ultrastructure of healed penetrating corneal wounds. *Investigative Ophthalmology and Visual Science*, 48, 157-165.
- Meek, K., Leonard, D., Connon, C., Dennis, S. & Khan, S. 2003. Transparency, swelling and scarring in the cornea. *Eye*, 17, 927-936.
- Schormack, M. 2003. Hydrogel contact lens-induced corneal warpage. *Contact Lens and Anterior Eye*, 153-159.
- Nourouzi, H., Rajavi, J. & Okhovaatpour, M. 2006. Time to resolution of corneal edema after long-term contact lens wear. *American Journal of Ophthalmology*, 142, 671-673
- Hashemi, H. & Mehravaran, S. 2010. Day to day clinically relevant corneal elevation, thickness and curvature parameters using the Orbscan II scanning slit topographer and the Pentacam Scheimpflug imaging device. *Middle East African Journal of Ophthalmology*, 17, 44-55.
- FDA, USA 2014. Medical devices. Products and medical procedures. Surgery and life support devices. In: SERVICES. United States Food and Drug Administration(ed.). Silver Springs, MD
- Royal College of Ophthalmologists 2011. A patients' guide to excimer laser refractive surgery.
- Smith, G. 2006. Refraction and visual acuity measurements: what are their measurement uncertainties? *Clinical and Experimental Optometry*, 89, 66-72
- Morgan, P. B. & Efron, N. 2009. Prescribing soft contact lenses for astigmatism. *Contact Lens and Anterior Eye*, 32, 97-98.
- Takacs, A. I., Mihaltz, K. & Nagy, Z. Z. 2011. Corneal density with the Pentacam after photorefractive keratectomy. *Journal of refractive surgery (Thorofare, NJ: 1995)*, 27, 269.
- Collins, J. W. & Carney, L. G. 1990. Visual performance in high myopia. *Current Eye Research*, 9, 217-224

For additional information please contact:  
aoifemarie.loyd@dit.ie