Investigation of Inter-Week Variations in Ocular Surface Parameters: Implications and Impact

[1] Centre for Myopia Research, School of Optometry, the Hong Kong Polytechnic University, Hong Kong.
[2] Centre for Eye and Vision Research (CEVR), 17W Hong Kong Science Park, Hong Kong.
[3] Research Centre for SHARP Vision (RCSV), the Hong Kong Polytechnic University, Hong Kong.

Dorothy SM Chung[1], Jimmy SH Tse[1], Cherie YK So[1], Peter H Li[2], Thomas C LAM[1,2,3]

THE HONG KONG POLYTECHNIC UNIVERSITY 香港理工大學

眼科視光學院 SCHOOL OF OPTOMETRY

Purpose

Ocular surface parameters play crucial roles in the success of contact lens wear. Previous studies have demonstrated the interaction between tolerance of contact lens wear and ocular surface characteristics[1]. People with different ocular surface characteristics may benefit from different types of contact lenses[2]. Traditional ocular surface assessments are often based on single-visit measurements, raising questions about their ability to truly reflect patient experiences over a short period.

Our study aims to address this knowledge gap by investigating the weekly variations of ocular surface parameters among healthy young adults.

Methods

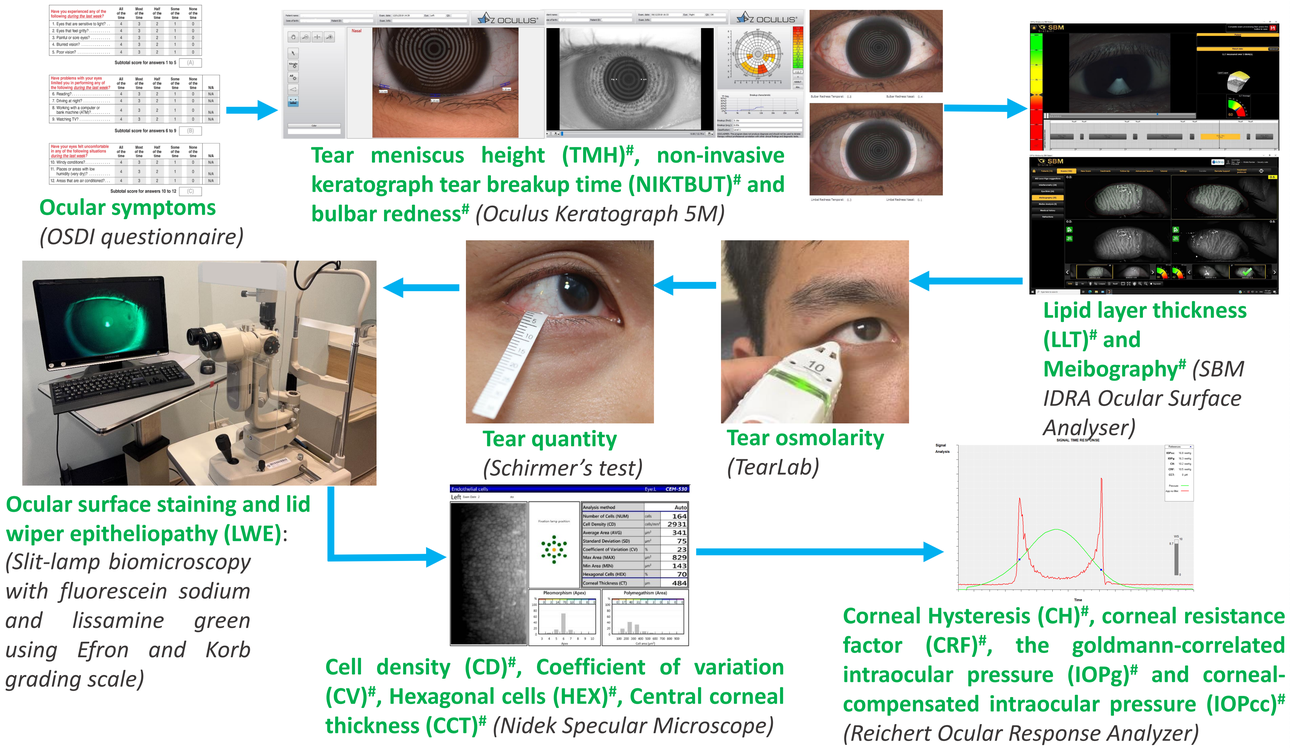
Subjects

- Subjects aged 18-30 years old
- Habitual or best-corrected monocular visual acuity at least 6/12 in both eyes
- No active ocular infections, inflammations, eyelid anomalies and uncontrolled or newly diagnosed systemic diseases in the past six months
- No contact lenses wear or any use of eyedrops 1 month prior to the visit

Measurements

- Two visits were scheduled and repeated at a similar time a week apart
- Room temperature and humidity were controlled and remained stable during the data collection
- Data from a randomly selected eye of each subject was analyzed

The following parameters were measured and compared between the two time points:



[Fig. 1] The order of measurement for minimizing alteration of different tear film parameters.
(# 3 readings were averaged in the result analysis)

Results

- A total of 21 eyes were examined in the study
  - 12 males and 9 females
  - mean age: 22.43 ± 1.94 years
- The results are presented in Table 1

	1st visit (n=21)	2nd visit (n=21)	p-value
OSDI	14.58 (15.23)	11.36 (13.41)	0.423
LLT (nm) ^	70.29 ± 15.89	67.48 ± 14.75	0.364
TMH (mm)	0.21 (0.12)	0.25 (0.12)	0.455
First _ NIKTBUT (s)	8.41 (4.40)	12.13 ± 5.80	0.229
Average _ NIKTBUT (s)	13.25 ± 5.80	14.84 (9.81)	0.452
Bulbar redness	0.53 (0.24)	0.63 (0.33)	0.348
Tear Osmolarity (mOsm/L) ^	294.19 ± 9.91	296.48 ± 11.50	0.428
Schirmer's test (mm/5mins)	26.00 (19.00)	19.10 ± 11.47	0.089
Corneal staining (grading)	1.00 (1.00)	1.00 (2.00)	0.484
Conjunctival staining (grading)	0.00 (1.00)	0.00 (1.00)	0.072
LWE (grading)	0.00 (1.00)	0.00 (1.00)	1.000
Upper meibomian gland loss (%) ^	**34.40 ± 5.12**	**32.43 ± 6.93**	***0.041**
Lower meibomian gland loss (%)	20.67 (8.33)	23.33 (11.00)	0.341
CD (cells/mm²)	2765 (284.33)	2779.97 ± 232.79	0.355
CV (%) ^	26.57 ± 2.69	26.59 ± 3.06	0.977
HEX (%)	68.00 ± 3.53	66.67 (2.67)	0.702
CCT (µm)	565 (16.34)	560.03 ± 27.84	0.219
CH ^	11.95 ± 2.07	12.00 ± 1.23	0.887
CRF	11.61 ± 2.05	11.43 (1.67)	0.257
IOPg (mmHg) ^	15.13 ± 2.20	14.51 ± 1.82	0.228
IOPcc (mmHg) ^	14.00 ± 2.49	13.46 ± 1.85	0.189

[Tab. 1] Parameters obtained between the two visits.
(*p < 0.05) [mean ± SD; median (IQR)] (Non-parametric test was used for analyses, ^ indicates parametric test)

- The meibomian gland loss on the upper lid showed a statistically significant variation of 1.97 ± 4.14% (p = 0.041) across the week.
- Other ocular parameters assessed showed no statistically significant differences between the two visits.

Conclusion

- The upper meibomian gland loss was statistically significant but **clinically insignificant** or could be partially **explained by** instrumental repeatability or imaging analysis variations.
- Most of the ocular surface parameters demonstrated **no significant variation** in **one week's time**.
- The ocular surface characteristics studied in this project are **minimally affected** by short-term temporal changes. Therefore, **single-visit measurement may adequately reflect patients' experiences over a short period**.
- Future areas of exploration could include an in-depth examination employing **temporal molecular changes using proteomics and lipidomics analysis**.

References

1. Glasson, M. J. et al., *The effect of short term contact lens wear on the tear film and ocular surface characteristics of tolerant and intolerant wearers.* Contact Lens and Anterior Eye, 2006. **29**(1),p. 41-47.
2. Ruiz-Alcocer, J. et al., *Impact of contact lens material and design on the ocular surface*. Clinical and Experimental Optometry, 2018. **101**(2),p. 188-192.

Acknowledgement

- Inno HK and Government of Hong Kong Special Administrative Region
- Residency Programme, School of Optometry, The Hong Kong Polytechnic University

Contacts

Miss Dorothy S. M. Chung
A034, Hong Kong Polytechnic University
Email: dorothy.chung@polyu.edu.hk

Disclosure:
The author does not have direct or indirect proprietary interests in any products mentioned in the poster