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Short Communication

The Requirement of Clinically Validated Technologies for Blinking Analysis

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The eyelids are not only provide physical protection of the ocular surface, but also have a significant role in homeostasis of the ocular surface by performing blinking [1]. Blinking is a vital function of the eyelids which redistributes the tear film and stabilizes the ocular surface [2]. Mechanism of blinking is precisely regulated [3] which is important in temporarily boosting the visual performance [4]. Ineffective blinking leads to unstable tear film and ultimately to several ocular surface diseases including dry eye disease [2]. Examples of dysfunctional blinking are incomplete blinks, high blink velocity, short blink intervals, forceful blinking, and low (<10/min) or high (>25/min) blink rates. The changes in blinking quality and rate could be (1) a response to ocular surface diseases, e.g. dry eye disease, or (2) primarily originated from neurologic or systemic diseases, e.g. benign essential blepharospasm or Parkinson's disease which leads to ocular surface and tear film destabilization [5,6].

The capability of evaluating the quality and rate of blinking will be a key element for conducting further studies on evaluating the role of blinking in ocular health as well as considering blinking as a biomarker of ocular and systemic diseases. Currently, there is a significant unmet need for clinical technologies to analyze the blinking quality and behavior. Current research on analysis of blinking is focused on (1) fabrication of wearable devices, or (2) development of video analyses algorithms. Examples of wearable devices are including glasses or headsets with sensors [7-10]. Although these devices can detect the blinking and evaluate the blink quality and rate, the presence of a device over the face or on the head could alter the typical behavior of the subjects. Moreover, these devices are not precise in distinguishing complete blinks from incomplete blinks and also not able to detect the pattern and rate of blinking in subjects with significantly fast blinking and eyelid twitching, e.g. in blepharospasm cases. The apparatus which are designed to assess the ocular surface are also capable of evaluating the blinking [11]. However, the necessity of positioning the head on the machine similar to slit lamp examination settings is still not ideal for evaluating the nature of subjects' eyelid blinking.

The second approach is developing the algorithms which are evaluating the video-tapes of the subjects' faces, while they are reading or watching videos, to assess the parameters of blinking and the blink rate [12-17]. Owing to simplicity of this approach and the ability of using these algorithms on personal (e.g. cell phones) or portable devices, this strategy has a promising potential to be translated into a clinically-validated module for evaluation of patients' blinking. This strategy has the application of notifying the patients while their blinking pattern or rate is not in the normal range. For example, it can notify the individuals with long hours of screen exposure to increase their blinking [14] or detect the abnormal blink rate or eyelid twitching in cases with blepharospasm indicating the necessity of treatment intervention.

In general, obtaining information from individuals' blinking pattern, quality and rate could be a novel tool for detecting and managing ocular and systemic diseases. Currently, lack of a clinically-validated technology to perform the blinking measurements and then provide robust report is obvious.

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Conflict of Interest

None.

Bibliography

1. X Zhang., *et al*. "Dry Eye Management: Targeting the Ocular Surface Microenvironment". *International Journal of Molecular Sciences* 18.7 (2017).

2. MTM Wang., *et al*. "Impact of blinking on ocular surface and tear film parameters". *Ocular Surface* 16.4 (2018): 424-429.

3. LJ Bour., *et al*. "Neurophysiological Aspects of Eye and Eyelid Movements During Blinking in Humans". *Journal of Neurophysiology* 83.1 (2000): 166-176.

4. JWA Ang and GW Maus. "Boosted visual performance after eye blinks". *Journal of Vision* 20.10 (2020): 2-2.

5. C Evinger., *et al*. "Dry eye, blinking, and blepharospasm". *Movement Disorders* 17.2 (2002) S75-78.

6. R Sandyk. "The significance of eye blink rate in parkinsonism: a hypothesis". *Interntaional Journal of Neuroscience* 51.1-2 (1990): 99-103.

7. T Mitchell., *et al*. "Video Viewing Blink Rate in Normal and Dry Eyes". *Eye Contact Lens* 47.8 (2021) 442-444.

8. A Dementyev., *et al*. "DualBlink: A Wearable Device to Continuously Detect, Track, and Actuate Blinking For Alleviating Dry Eyes and Computer Vision Syndrome". *Interactive, Mobile, Wearable and Ubiquitous Technologies* (2017): 19.

9. J Espinosa., *et al*. "Comparative analysis of spontaneous blinking and the corneal reflex". *Royal Society Open Science* 7.12 (2020) 201016.

10. X Jiang., *et al*. "Capturing and evaluating blinks from video-based eyetrackers". *Behavior Research Methods* 45.3 (2013): 656-663.

11. DH Szczesna., *et al*. "Predicting dry eye using noninvasive techniques of tear film surface assessment". *Investigative Ophthalmology and Visual Science* 52.2 (2011): 751-756.

12. K Tsubota., *et al*. "Quantitative videographic analysis of blinking in normal subjects and patients with dry eye". *Archives of Ophthalmology* 114.6 (1996): 715-720.

13. G Yazdanpanah., *et al*. "Change in Blink Rate Following Botulinum Toxin Injection in Benign Essential Blepharospasm". *Investigative Ophthalmology and Visual Science* 63.7 (2022): 607-A0308-607-A0308.

14. DL Ashwini., *et al*. "Efficacy of blink software in improving the blink rate and dry eye symptoms in visual display terminal users - A single-blinded randomized control trial". *Indian Journal of Ophthalmology* 69.10 (2021): 2643-2648.

15. DS Nosch., *et al*. "Blink Animation Software to Improve Blinking and Dry Eye Symptoms". *Optometry and Vision Science* 92.9 (2015): e310-315.

16. Y Su., *et al*. "Spontaneous Eye Blink Patterns in Dry Eye: Clinical Correlations". *Investigative Ophthalmology and Visual Science* 59.12 (2018): 5149-5156.

17. FHW Mak., *et al*. "Videographic Analysis of Blink Dynamics following Upper Eyelid Blepharoplasty and Its Association with Dry Eye". *Plastic and Reconstructive Surgery – Global Open* 8.7 (2020): e2991.