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The effect of fluorescein sodium volume on anterior eye surface measurements using the Medmont corneal topographer

J.A. Mulder^{1,2}, M.M. van Tilborg², B. Huntjens¹

1. Centre of Applied Vision Research, City, University of London, Northampton Square, London, EC1V 0HB, United Kingdom

2. University of Applied Sciences Utrecht, Postbus 12011, 3508 AA Utrecht, The Netherlands

Purpose

This study investigates the effect of fluorescein sodium (NaFI) volume on the regularity of the anterior eye surface using the Medmont corneal topographer measurements.

Method

The simulated keratometry values (flat = Kf; steep = Ks), Inferior Superior Index (ISI), Surface Asymmetry Index (SAI), and Surface Regularity Index (SRI) measurements, using the E300 corneal topographer (Medmont International Pty Ltd., Victoria, Australia), were taken three times under three different conditions: baseline (without NaFI), including a single dose NaFI, and a double dose NaFI. Of the 57 participants (males n=23, females n=34) only the right eye was included. Mean age (\pm SD) was 35.1 \pm 15.2 years (range 19 to 65 years); grouped by age (<40 years [n=34] versus \geq 40 years [n=23]). There was no history of ocular diseases, contact lens wear, or previously diagnosed dry eye.

Results

At baseline, there were no significant differences between the three consecutive measures of Kf (p=0.30), Ks (p=0.71), ISI (p=0.10), SAI (p=0.53) and SRI (p=0.34). This was comparable to any amount of NaFI (p>0.05). Median ISI values following the addition of 1 or 2 doses NaFI significantly decreased compared to baseline (both z=3.2, effect size 0.43; p=0.001), irrespective of age group (p=0.74). No significant differences between the three conditions for any other parameter (p>0.05) were found. The intraclass correlation coefficient (ICC) improved for Kf (0.99), Ks (0.99) and SRI (0.60) with one dose of NaFI, compared to baseline or 2 doses of NaFI. For IS and SAI, ICC was most reliable without NaFI (0.85 and 0.77 respectively).

Conclusion

One drop NaFI increases reliability in corneal topography and regularity measurements using the E300 topographer. Corneal asymmetry measurements (IS and SAI) are more reliable without any ocular dye. It is possible that the addition of NaFI enhances tear film reflection during topography measurements, but the addition of a liquid solution decreases symmetry.

Jeroen completed his Bachelor in Optometry at the Hogeschool van Utrecht in 2005, after graduating as a Dispensing Optician in 2001 from ROC Zadkine College in the Netherlands. Following several years as practicing optometrist, he now holds a lectureship at the Hogeschool van Utrecht since 2011 where he is responsible for all contact lens related education. Jeroen was awarded an MSc in Clinical Optometry from City, University of London early 2018. His dissertation was titled 'The effect of fluorescein sodium dye on tear film characteristics'.