

NCC2016 Paper Abstracts
Free paper sessions
Sunday, March 13, 2016 10:30 – 11:30
Netherlands, Veldhoven, de Koningshof,
Baroniezaal

Organization Section: NCC/ BCLA
Moderator: James Wolffsohn

Paper Number: 1

Presentation time: 10:30-10:45

Tribological Classification Of Contact Lenses- From Coefficient Of Friction To Sliding Work: Can contact lens wear help you burn calories?

Samuele Tosatti, Olof Sterner, Rudolf Aeschlimann, Stefan Zuercher, Charles Scales, Donald Riederer, Nicholas Spencer

Purpose: Different approaches and measurement methodologies have been considered for studying friction between the contact lens (CL) and eyelid to understand the relationship between lubricity and comfort. The surface lubricity of CL materials is typically represented by a coefficient of friction (CoF) i.e. ratio of lateral-to-normal force. However, this ratio is frequently not a constant when dealing with soft materials, therefore CoF may not represent a reliable single figure-of-merit. This study aims to overcome this issue by representing lubricity as the average work consumed during sliding, derived from the average function of a non-linear relationship between lateral and normal forces.

Method: An optical microscope was fitted to a micro-tribometer device enabling in-situ measurement of the effective contact area on the CL. Tribological measurements of three CL materials (senofilcon A, etafilcon A, lotrafilcon B, n=10) were conducted in tear-like fluid against a mucin-coated glass counter surface. The applied normal force varied between 0.25 and 4.0 mN with a stroke length of 1.0mm at a sliding speed of 0.1mm/s.

Results: The three CL materials had significantly different values of average work ($p < 0.05$). Over a 2 mm sliding distance, the different lens materials dissipated 37 ± 4 nJ (senofilcon A), 85 ± 25 nJ (etafilcon A), and 689 ± 82 nJ (lotrafilcon B).

Conclusion: Average work represents a comparative single figure-of-merit of the lubricity of CL materials that also allows for cumulative energy expenditure to be calculated. The tribological characteristics of a CL can thus be captured in a single number, incorporating changes occurring to

the lens surface during wear. Average work is proposed as a more relevant correlate for on-eye comfort compared to CoF due to the difficulty in assigning a CoF for CL materials. Future work aimed at correlating the sliding work of new and worn lenses with clinical data should be considered to assess the relevance of the methodology.

Research funding received: Work was funded by Johnson & Johnson Vision Care Inc., Jacksonville, FL, USA

Paper Number: 2

Presentation time: 10:45-11.00

Clinical investigation of a daily disposable silicone hydrogel contact lens: Stenofilcon A

Kishor Sapkota, Sandra Franco, Madalena Lira

Purpose: The aim of this study was to investigate the effect of Stenofilcon A lens wear on conjunctival cytology, corneal biomechanical properties and conjunctival and corneal physiology.

Methods: This was a longitudinal clinical case-control study conducted in University of Minho, Portugal. Fifteen neophyte subjects were fitted with a stenofilcon A lens in one eye and a comfilcon A in the other control eye. Impression cytology was performed on the superior bulbar conjunctiva. Goblet cell density (GCD) and epithelial cell morphology were studied with a light microscope. Ocular response analyzer was used to measure corneal resistance factor (CRF) and corneal hysteresis (CH). Ocular surface physiology (conjunctival limbal and bulbar redness, conjunctival and corneal staining) were examined with a slit lamp and graded according to Efron's grading system. All of these tests were performed during baseline visit and after three months of lens wear.

Results: The mean age of the subjects was 23.60 ± 2.49 years and 73% were female. After three months, there was a significant decrease in CRF ($p = 0.008$), but there was no change in CH ($P = 0.460$). Cytological findings showed no change in GCD and epithelial cell metaplasia ($p > 0.05$). There was an increase in corneal staining ($p = 0.001$) but there was no change in bulbar redness, limbal redness and conjunctival staining ($p > 0.05$). No significant difference was observed in changes between study eyes and the control eyes with comfilcon A lens wear ($p > 0.05$).

Conclusion: Stenofilcon A lens wear decreased CRF, but there was no change on conjunctival cytology and corneal and

conjunctival physiology. Stenofilcon A lens affected the ocular surface similar with comfilcon A lens. **Keywords:** Stenofilcon A, soft contact lens, corneal resistance factor, corneal hysteresis, conjunctival staining, corneal staining, bulbar redness.

Research funding received: None

Paper Number: 7

Presentation time: 11:00-11:15

Adverse Events and Retention of Children and Teens in a Large Daily Disposable Contact Lens Registry

Robin Chalmers, Sheila Hickson-Curran, Lisa Keay, William Gleason

Purpose: To measure the annual adverse event rate (AEs) and determine factors that affected retention of children and teens while wearing one of two daily disposable contact lenses (DDCLs; etafilcon A or narafilcon B). Also, to describe stability of overall opinion of lenses, and average and comfortable wearing times, during that year.

Methods: Rate of adverse events per year was computed for all AEs and for corneal infiltrative events (CIEs) in a large DDCL registry study. Retention among 202 children and teens (aged 8-17 years, 48% new wearers, 42% males) was determined and factors impacting discontinuation were investigated with Chi-Square tests. Other variables were reported over time.

Results: There were no CIEs reported and the AE rate was 1.1% (etafilcon A) and 1.3%/year (narafilcon B) ($p=ns$); combined AE rate was 1.2% (95% CI 0.3-4.7).. Retention was 82% for new and 87% for experienced wearers ($p=0.44$). New wearers were more likely than experienced wearers to discontinue at the 2-week survey (41% vs 18%). Gender had no influence on retention for new ($p=0.5$) or experienced ($p=0.8$) wearers. Experienced wearers' comfortable wearing time increased significantly with DDCLs (10.9 ± 3.6 vs. 12.0 ± 3.4 hrs, $p=0.027$), but average total wearing time did not (12.6 ± 3.6 vs. 13.0 ± 3.4 hrs, $p=0.91$). Experienced wearers' overall opinion of CLs improved significantly from 45% with Excellent/Very Good with habitual CLs to 84% with DDCLs ($p=0.0003$).

Conclusions: Annual rates of adverse events were very low and there were no corneal infiltrative events in children and teens in the registry. Retention was very high and was not influenced by gender or habitual lens wearing status. New wearers

tended to leave the study early, indicating the need for early follow-up visits for new wearers in this age group. For experienced wearers, comfortable wearing time was improved by ≥ 1 hour and overall opinion of lenses improved significantly after refitting with these DDCLs.

Research funding received: This study was support in full by Johnson & Johnson Vision Care, Inc.

Paper Number: 3

Presentation time: 11.15-11:30

Predicting success with multifocal contact lenses

Ahmed Sivardeen, Deborah Laughton, James Wolffsohn

Purpose: To determine the utility of a range of clinical and non-clinical indicators to aid the initial selection of the optimum presbyopic contact lens. In addition, to assess whether lens preference was influenced by the visual performance compared to the other designs trialled (intra-subject) or compared to patients who preferred other designs (inter-subject).

Methods: A double-masked randomised crossover trial of Air Optix Aqua multifocal, PureVision 2 for Presbyopia, Acuvue OASYS for Presbyopia, Biofinity multifocal and monovision was conducted on 35 presbyopes (54.3 ± 6.2 years). Participant lifestyle, personality (assessed subjectively the patient's representation of his/her view of his/her personality in a linear scale from 0-easy going to 10-a perfectionist) and aberrometry were assessed prior to lens fitting. After 4 weeks of wear, high and low contrast visual acuity (VA) under photopic and mesopic conditions, reading speed, Near Activity Visual Questionnaire (NAVQ) rating, subjective quality-of-vision scoring, defocus curves, stereopsis, halometry, aberrometry and ocular physiology were quantified.

Results: After trialling all the lenses, preference was mixed ($n=12$ Biofinity, $n=10$ monovision, $n=7$ Purevision, $n=4$ Air Optix Aqua, $n=2$ Oasys). Lens preference was not dependent on personality ($F=1.182$, $p=0.323$) or the hours spent working at near ($p=0.535$) or intermediate ($p=0.759$) daily. No intersubject or strong intrasubject relationships emerged between lens preference and reading speed, NAVQ rating, halo size, aberrometry or ocular physiology ($p>0.05$).

Conclusions: Participant lifestyle and personality, ocular optics, contact lens

visual performance and ocular physiology provided poor indicators of the preferred lens type after 4 weeks of wear. This is confounded by the wide range of task visual demands of presbyopes and the limited optical differences between current multifocal contact lens designs. The influence of the near addition on the lens preference would be an interesting area for further research.

Research funding received: NONE