

NCC2018 Paper Abstracts  
Free paper sessions  
Monday, March 12, 2018 09:45 – 10:45  
Netherlands, Veldhoven, de Koningshof,  
Baroniezaal

**Organization Section:** NCC/ BCLA

**Moderator:** Alejandra Consejo

**Paper Number:** 21

**Presentation time:** 09:45-09:53

**Endothelial Response to Scleral Lens  
Wear Fitted with Various Clearance**

*Langis Michaud, Claude J Giasson, Marc  
Mellilo, Josianne Rancourt, Josianne  
Robillard*

**Purpose:** This study aimed to identify  
presence of blebs following scleral lens  
wear fitted with various clearance.

**Method:** 21 subjects were fitted with 2  
identical scleral lenses except for  
clearances of 200 and 400  $\mu\text{m}$  (SL200 and  
SL400). During the two visits, SL were  
worn on one eye for 25 minutes, the  
other eye was a control. The endothelium  
was photographed with a specular  
microscope before and after wear. A  
“blind” observer identified cells or blebs  
in the images and processed them with  
image J to get their surface (in pixels). The  
difference in BRS over the sampled area  
between SL200 and SL400 was tested for  
significance with a Wilcoxon matched  
signed-rank test. Paired t tests were used  
to assess differences between cell and  
bleb areas.

**Results:** Blebs occurred in 43(SL200) and  
67% (SL400) of subjects. The difference in  
BRS was not significantly different  
(Medians: SL200: 0.00, SL400: 0.27%,  $p =$   
0.074). The difference between bleb and  
cell areas (blebs:  $181.8 \pm 17.5$ ; cells:  $228.9$   
 $\pm 18.9$  pixels;  $n=14$ ) was significant. The  
average bleb area is  $300 \mu\text{m}^2$ .

**Conclusions:** The presence of blebs is  
identified for the first time related to  
scleral lens wear. Scleral lenses fitted with  
higher clearance show more blebs- and  
then hypoxic stress- than those fitted with  
shallower tear reservoir.

**Research funding received:** Lenses  
provided by Laboratoires Blanchard  
(Sherbrooke, Canada)

**Paper Number:** 22

**Presentation time:** 09:53-10:01

**Evaluating Virtual Scleral Lens Fitting  
Using Corneal Topography**

*Catherine Wright, Debby Yeung, Alan Ng,  
Luigina Sorbara*

**Purpose:** To evaluate central corneal  
clearance (CCC) and vision with the wear  
of scleral lenses predicted by built-in  
software from corneal topography.  
Comparisons of CCC with slit lamp  
examination (SLE) and OCT were made to  
determine if compensation is required.

**Method:** Corneal topographies were  
obtained for 18 normal corneae using  
Medmont E300 (Precision Technology).  
Using topographer software, parameters  
of the ICD FlexFit™ (Paragon Vision  
Science), 16.3mm in diameter, were  
theoretically determined based on the  
best composite topographic maps for  
each eye and each subject's refraction. An  
initial CCC of  $350\mu\text{m}$  and a plano over-  
refraction were used to determine the  
scleral lens parameters. Evaluation using  
SLE by two researchers and AS-OCT  
(Visante, Zeiss) after ten minutes of lens  
application was performed to reflect CCC.  
VA's and over-refractions were measured.

**Results:** Results: 18 monocular fits were  
analysed. The mean BOZR was  
 $8.61 \pm 0.49\text{mm}$  (range of 8.25 to 9.5mm);  
the mean sagittal depth of the lenses was  
 $3829 \pm 145\mu\text{m}$  (range of 3600 to  $4000\mu\text{m}$ ).  
Medmont predicted initial CCC of  
 $362.3 \pm 13.75\mu\text{m}$ . Compared to SLE and  
OCT, the Medmont over-estimated the  
thickness of the initial CCC by  
 $65.6 \pm 113.9\mu\text{m}$  ( $p=0.026$ ) and  
 $121.58 \pm 46.75\mu\text{m}$  ( $p=0.026$ ), respectively.  
VA's of 6/7.5 or better were achieved in  
88.9% predicted by the Medmont. The  
mean over-refraction was  $-0.05 \pm 0.32\text{D}$ .

**Conclusions:** The Medmont is able to  
theoretically determine sagittal height  
and contact lens power. With comparison  
to SLE and OCT, the differences in

measurements of CCC with Medmont are statistically significant; however, these differences may not be considered significant clinically. Over-estimation of CCC may be attributed to the settling of the lenses that occurred. This user-friendly software may be able to help improve the efficiency and ease of scleral lens fitting without the use of large fitting sets.

**Research funding received:** N/A

**Paper Number:** 23

**Presentation time:** 10:01-10:09

**Medium-Term Performance of Scleral Contact Lenses in Irregular and Healthy Corneas: Results of Visual Acuity, Symptomatology and Halometry**

*Rute J Macedo-de-Araújo, Eef van der Worp, Ana Amorim-de-Sousa, Ron Beerten, José M. González-Méijome*

**Purpose:** To report vision quality and symptomatology outcomes of subjects wearing scleral contact lenses (ScCL) up to 6 months of wear.

**Method:** This is a prospective dispensing case series involving 125 eyes of 69 subjects (35 female) fitted with mini ScCL (Procornea, Eerbeek), 98 eyes with irregular corneas (Group1) and 27 eyes with healthy corneas and high refractive errors (Group2). Evaluations were performed at Baseline, where measurements with habitual correction (HC) and best spectacle correction (BSC) were done; at V1 (lens dispense visit) and at 1, 3 and 6 months after V1 (V2, V3 and V4, respectively). High and Low contrast visual acuity (HCVA and LCVA) were measured with EDTRS LogMAR chart. Light Distortion Index (LDI,%) was analyzed with Light Distortion Analyzer (LDA, UMinho). Symptomatology was assessed with Ocular Surface Disease Index (OSDI) questionnaire.

**Results:** HCVA improved after ScCL application when compared to HC and BSC in both groups (improvement of  $+0.36\pm 0.33$  and  $+0.29\pm 0.26$ , respectively, to  $+0.08\pm 0.14$  in Group1 ( $p<0.001$ ) and  $+0.17\pm 0.23$  and  $+0.13\pm 0.18$ , respectively,

to  $+0.10\pm 0.16$  in Group2 ( $p<0.05$ )), remaining stable over the 6 month period. LCVA with ScCL also improved when compared to HC and BSC in both groups, with statistical significant differences only in Group1 ( $p<0.001$ ). OSDI scores at V2 showed a statistical significant reduction when compared to Baseline (reduction from  $46.93\pm 22.32$  to  $24.12\pm 14.46$  in Group1 and from  $26.96\pm 15.48$  to  $17.02\pm 13.20$  in Group2,  $p<0.05$ ). There were also significant improvements in LDI with ScCL compared to HC and BSC in both groups ( $p<0.05$ ). OSDI scores and LDI remained stable after V2 in both groups of patients.

**Conclusions:** Beyond the marked improvement in HCVA and LCVA, ScCL have also demonstrated to significantly reduce the ocular surface related symptoms and the light disturbances perceived in dim light conditions by patients of both groups, in a constant manner over 6-month follow-up period.

**Research funding received:** This work has been funded by a Research Grant from Bausch+Lomb (Wilmington, Massachusetts, USA). Partially funded also by Strategic Funding UID/FIS/04650/2013 assigned to Center of Physics (CFUM) and competitive projects PTDC/SAU-BEB/098392/2008, PTDC/SAU-BEB/098391/2008, PTDC/FIS-OPT/0677/2014 granted to CEORLab-CFUM by FCT-Portugal. Ron Beerten is employee of Procornea. None other author has a financial interest in the brands and materials mentioned

**Paper Number:** 24

**Presentation time:** 10:09-10:17

**Scleral and corneal elevation changes following short-term miniscleral contact lens wear**

*Alejandra Consejo, Maarten Van Hoey, Jos J Rozema, D. Robert Iskander*

**Purpose:** The aim of this pilot study is to quantify corneal and scleral elevation changes as a consequence of miniscleral contact lens wear.

**Method:** Six healthy volunteer subjects wore a highly gas-permeable miniscleral contact lens of 16.5 mm diameter (miniMISA, Microlens, Netherlands) during a 5 hours period. Data was acquired using Eye Surface Profiler (ESP, Eaglet Eye BV, Netherlands), a profilometer with the potential to measure the corneo-scleral topography for a diameter up to 20 mm. Baseline measurements were obtained without contact lens wear (session 1, S1). Later, measurements were collected immediately after lens removal after 5 hours of wear (session 2, S2), and finally 3 hours after lens removal (session 3, S3). Elevation differences in corneal (0.0-10.0 mm diameter) and scleral region (12.0-20.0 mm diameter) were calculated with custom made software. ANOVA repeated measurements was applied to compare elevation within sessions. **Results:** Significant scleral flattening was observed immediately following lens removal (overall mean (S1 vs. S2)  $480 \pm 140 \mu\text{m}$ ,  $p = 0.03$ ) which did not completely return to baseline levels 3 hours after lens removal (overall mean (S1 vs. S3)  $280 \pm 180 \mu\text{m}$ ,  $p > 0.05$ ). No significant corneal flattening was observed immediately following lens removal ( $p > 0.05$ ) or during the recovery period ( $p > 0.05$ ).

**Conclusions:** Short term miniscleral contact lens wear alters scleral topography but do not produce significant corneal shape changes. Gaining knowledge on the effects of lens settling, could help the practitioner prevent cases of scleral blanching or discomfort due to an excessive compression of the lens.

**Research funding received:** This work was supported by the National Science Centre (Poland) under the PRELUDIUM funding scheme; project no. 2016/21/N/ST7/02298 (public funding)

**Paper Number:** 25

**Presentation time:** 10:17-10:25

**Comparison of two methods of determining central corneal vault under a scleral lens: estimation by slit lamp**

### **biomicroscope and anterior segment OCT**

*Claire McDonnell, Darragh O'Donnell, Lynn O'Mara, Shannon Power*

**Purpose:** The aim of this study was to ascertain if there is agreement in the measurement of central corneal vault (CCV) under a scleral lens, between estimations made using a slit lamp biomicroscope (SLB) and measurements made using anterior segment optical coherence tomography (AS-OCT).

**Method:** 30 images were taken of CCV under various scleral lenses using a SLB and an AS-OCT. Estimations of CCV from SLB photographs were made using known thicknesses of the scleral lenses used and imagej software. The in-built measurement callipers was used to measure CCV on the AS-OCT. Right eyes were imaged on the AS-OCT first and the SLB second and vice versa for left eyes.

**Results:** Bland-Altman analysis of scleral lens thicknesses as measured with a radiuscope thickness callipers and measured with the AS-OCT showed fair agreement (mean difference 18.6 microns and lower and upper limits of agreement were -14.72 and 52 microns respectively) and so it was assumed that the AS-OCT was making reasonably accurate measurements of the CCV. Bland Altman analysis of the agreement between the two methods of measuring CCV showed a mean difference of 128 microns and the lower and upper limits of agreement were -47.7 and 303.6 microns respectively.

**Conclusions:** There is a huge variation in the estimation of CCV as made by SLB when compared to measurements taken by AS-OCT. This variation cannot be explained by; differences in corneal curvature, magnification of the scleral lens, angle at which the illumination is at for the SLB estimation, differences in corneal location between the two measurements or lens settling. It is recommended that CCV should not be estimated using a SLB as these estimations appear to be highly unreliable.

**Research funding received:** Topcon Ireland gave us a loan of an optical coherence tomographer for the duration of this study.

**Paper Number:** 26

**Presentation time:** 10:25-10:33

**Differences in the corneo-scleral profile measured by Fourier domain profilometry between normal subjects and subjects with keratoconus**

*David P Pinero, Antonio Martínez-Abad, Roberto Soto-Negro, Pedro Ruiz-Fortes, Rafael J Pérez-Cambrodí*

**Purpose:** To evaluate and characterize the differences between normal subjects and subjects with keratoconus in the corneo-scleral profile and to evaluate its diagnostic ability for keratoconus detection.

**Method:** Two groups were created in this comparative prospective study: control group including 88 healthy eyes (80.7%, 88 patients), and keratoconus group including 21 eyes (19.3%, 11 patients) with keratoconus. In all cases, a complete ocular examination was performed, including the analysis of the corneo-scleral topographic profile with the Fourier domain profilometer Eye Surface Profiler (ESP, Eaglet-Eye BV, Houten, The Netherlands). Differences between groups were evaluated as well as the diagnostic ability of corneo-scleral topographic data for keratoconus detection.

**Results:** No significant differences were detected between groups neither for mean corneal ( $p=0.085$ ) nor for scleral ( $p=0.871$ ) radii. For an 11-mm chord, significant differences were only obtained between groups for temporal sagittal height (SHt) ( $p=0.040$ ), with higher values in the keratoconus group. For a 12-mm chord, significant differences were obtained for SHt ( $p=0.041$ ), maximum sagittal height (Shmax) ( $p=0.043$ ) and difference between temporal and nasal sagittal heights (SHtn) ( $p=0.025$ ), with also higher values in the keratoconus group. Similarly, for a 13-mm chord, significantly higher values of SHt ( $p=0.040$ ) and SHtn

( $p=0.034$ ) were found in the keratoconus group. Furthermore, significantly lower values of inferior tangent angle at limbus ( $p=0.024$ ) were found in the keratoconus group. The ROC (receiver operating characteristic) curve analysis found areas under the curve of 0.653 (cut-off point: 2.90 mm, sensitivity: 61.1%, specificity: 63.0%) and 0.657 (cut-off point: 0.085 mm, sensitivity: 61.1%, specificity: 57.0%) for 13-mm chord SHt and SHtn, respectively.

**Conclusions:** Higher level of asymmetry is present in the corneoscleral profile of the keratoconus eye compared to healthy eyes, suggesting a potential structural alteration in both cornea and anterior sclera in this pathology. The diagnostic value of corneoscleral topographic data for keratoconus detection is limited, being necessary their combination with additional parameters.

**Research funding received:** None

**Paper Number:** 27

**Presentation time:** 10:33-10:41

**Case study on a novel Double Reservoir Contactlens (DRL) for moderate to high myopia**

*Maximilian Hofmann*

**Purpose:** The novel Double Reservoir Lens (DRL) for orthokeratology is thought to be able to treat myopia up to -7,00 dpt. The aim of the study was to analyse this claim in terms of a case study. Further, the use of the DRL was analysed concerning efficiency of the treatment, safe usability for the end user and practicability for the fitter.

**Method:** The DRL was fitted on 11 participants (21 eyes). The average baseline amount of spherical equivalent was  $-6,33 \pm 0,85$  dpt and the visual acuity with the best correction was  $1,11 \pm 0,16$  log MAR. Topography, visual acuity and the spherical equivalent was measured during the follow-up visits after the 1st, 3rd 10th night and 1 month with DRL. The cornea was checked for epithelial changes caused by lens wear. Furthermore, the

contrast sensitivity, mesopic vision and glare sensitivity was measured.

**Results:** Results: After one month nightly use of the DRL, the average visual acuity(s.c.) was  $1,11 \pm 0,27$  with a created central optical zone of  $2,66 \pm 0,52$  mm. No significant differences in contrast sensitivity ( $p>0,05$ ) and mesopic vision ( $p>0,05$ ) were observed between baseline and 4-week follow-up. Glare sensitivity increased up to two grads for approximately half of the participants being yet not statistically significant ( $p>0,05$ ). After the first night one third of the eyes treated with DRL showed corneal staining. During further follow-ups all corneas recovered fully and showed no sign of staining. An average of 1,86 lenses per participant were required in order to reach the target correction.

**Conclusions:** With DRL for orthokeratology good results concerning the photopic vision were achieved, providing a high level of safety for the participant through the process. Despite it is a time-consuming process for the fitter, the DRL is a promising supplement to existing lenses for orthokeratology.

**Research funding received:** DRL from Precilens (France)

End of session