Purpose: As a simple and convenient method of determining the stability of the IOL materials, we demonstrated that immersion of intraocular lenses (IOLs) in water at high temperature for an extended period leads to opacification and deterioration. Changes in opacity and the associated deterioration of resolution were compared after a severe accelerated deterioration test for periods equivalent to 5, 6, 7, 8, 15 and 20 years.
Methods: Three each of the following 5 types of colored acrylic IOLs were used: SN60WF (Alcon) and AN6K (KOWA), manufactured by the cast molding method, and NY-60(HOYA), NX-60 (Santen) and NS-60YG (NIDEK), manufactured by the lath-cut method. Each IOL was placed in a 50-mL screw-tube bottle containing ultrapure water, and soaked at 100°C for 29, 35, 40, 46, 86 and 115 days (corresponding to 5, 6, 7, 8, 15 and 20 years, respectively). The resolution and MTF (Modulated Transfer Function) of the IOLs were observed after 115 days.
Results: Appearance: Opacities, to a greater or less degree, were observed in all IOLs in water except NX60. When the IOLs were dried at a room temperature of 25°C for 48 hours, opacity disappeared from all IOLs except SN60WF. Resolution: The resolution of NY-60 declined after 5 years. No measurement was possible after 15 years in the case of SN60WF. AN6K remained clear for 8 years, but resolution declined after 15 years. NX-60 and NS-60YG showed no changes for 20 years. MTF: NX-60 and NS-60YG showed favorable values even after the 20-year-accelerated deterioration test.
Conclusions: Long-term observation of colored acrylic IOLs after a severe accelerated deterioration test suggested that they can be roughly grouped into those with reversible changes and those with irreversible changes. Furthermore, some IOLs showed no changes in either resolution or MTF.
Commercial Relationships: **Kenji Kawai**, None
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Presentation Time: 8:30 AM - 10:15 AM
Use the Double-Pass Technique to Quantify Optical Quality and Intraocular Scattering in Amblyopic Eyes: A Pilot Study
Juan Carlos Ondategui Parra[1], Juan Antonio Martínez-Roda[1], Meritxell Vilaseca[2], Ferran Sanabria[2], Jaume Pujol[2]. [1]Optics and Optometry Department, Technical University of Catalonia, University Vision Center (CUV), Barcelona, Spain; [2]Optics and Optometry Department, Technical University of Catalonia, Centre for Sensors, Instruments and Systems Develo, Spain.
Purpose: To assess ocular optical quality (OQ) and intraocular scattering (IS) from double-pass (DP) images in patients with amblyopia.
Methods: We considered a group of 30 eyes of 30 subjects with treated amblyopia and a control group of 43 eyes of 27 healthy young subjects. Mean ages (± SD [range]) were of 9.90 ± 3.60 (8.62 to 10.93 yr.) for the amblyopic group and 7.13 ± 2.56 (5.71 to 8.55 yr.) for the control group. DP images with a pupil diameter of 4 mm were taken using a clinical instrument (OQAS, Visiometrics SL, Spain) (Güell et al. J Cataract Refr Surg 2004), and several parameters related to the OQ and IS of the eye (Strehl ratio, OQAS values [OV] at contrasts 100%, 20% and 9%, and Objective Scatter Index [OSI]) (Martínez-Roda et al. Clin Exp Optom 2011; Artal et al. Plos 2011) were computed. Moreover, we measured the best spectacle-corrected visual acuity (BSCVA) with a standard logMAR chart.
Results: LogMAR BSCVA for amblyopic eyes was 0.12 ± 0.11 and for control group -0.05 ± 0.11. OQ and IS parameters for amblyopic eyes were: Strehl ratio 0.19 ± 0.08; OV 100% 0.97 ± 0.39; OV 20% 1.03 ± 0.47; OV 9% 1.10 ± 0.55; and OSI 1.34 ± 1.11. For the control group we obtained: Strehl ratio 0.25 ± 0.07; OV 100% 1.41 ± 0.25, OV 20% 1.49 ± 0.36, OV 9% 1.54 ± 0.44; and OSI 0.58 ± 0.20. The results reported statistically significant differences ($p<0.05$) in the majority of the ocular quality parameters when amblyopic eyes were compared to those belonging to the control group, even in those already treated and with normal visual acuity values.
Conclusions: We found lower OQ and IS values in treated amblyopic eyes compared with those belonging to the control group. However conventional visual acuity tests did not show differences between groups. Future work will be focused on analysing the OQ and IS variations between treated and untreated amblyopic eyes, and on exploring the usefulness of retinal imaging analysis for objective diagnosis and treatment of patients with amblyopia.
Commercial Relationships: **Juan Carlos Ondategui Parra**, None; **Juan Antonio Martínez-Roda**, None; **Meritxell Vilaseca**, None; **Ferran Sanabria**, None; **Jaume Pujol**, Visiometrics (P)
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Presentation Time: 8:30 AM - 10:15 AM
Comparison of Different IOLs in Secondary Cataract Assessment
Tiago A. Briccoli, Bruno F. Fernandes, Patrick Logan, Shawn C. Maloney, Alexandre N. Odashiro, Miguel N. Burnier, Jr.. Henry C. Witelson Ocular Pathology Laboratory, Montreal, QC, Canada.
Purpose: Cataract surgery is the most common ocular surgical procedure worldwide, and the quality of the implants has utmost importance for the outcome of the surgery. Over time, posterior capsule opacification (PCO) can occur, creating a secondary cataract. Approximately 30% of patients develop PCO within 1-5 years following surgery. In this study, we perform a posterior view (Miyake) macroscopic analysis to grade PCO and the location of the IOL.
Methods: Ninety-four formalin-fixed eyes were received from the Eye Bank of Ontario (50 phakic and 44 pseudophakic eyes). The globes were sectioned along the coronal axis and the anterior half was placed under a microscope with the cornea facing down. The location of the haptics was noted as bag-bag (B-B), bag-sulcus (B-S), sulcus-sulcus (S-S). The ciliary ring was measured in its longitudinal (L) and transverse (T) axis. The decentration index was obtained with the formula y - x/2; where y and x are the largest and the smallest distance between the IOL optic edge and the margin of the ciliary ring, respectively. The density of the central PCO was graded from 1 to 4. The Soemmering's ring was graded (1 to 4) for extent (SRA, quadrants involved) and intensity (SRI, loss of transparency). The eyes were classified in the following groups: Crystalline lens, Acrysof Natural, Acrysof, and Other IOLs. Images were analyzed using the IMAGEJ software. Statistical comparisons were made using the Student T-test and a $p<0.05$ was considered significant.
Results: The overall ciliary ring diameter was 10.1 + 0.67 mm (L) x 10 + 0.67 mm (T). The average difference between (L) and (T) was 0.43 + 0.36 mm; this difference was statistically significant only within the "Other IOL" group ($p=0.0002$). The location of the haptics were: 38 B-B; 4 B-S and 2 S-S. The overall decentration index was 1.5 + 0.37, Central PCO was 0.75 + 0.9, SRA was 3.75 + 1.49, and SRI was 2.5 + 1.29. There were no significant differences between Acrysof and Acrysof Natural lenses. The "Other IOL" group showed significantly more decentration (1.51 + 0.4) and significantly higher Central PCO (1.51 + 0.4), SRA (3.52 + 1.16), and SRI (2.88 + 1.17) scores, compared to the other groups ($p<0.05$).
Conclusions: This study showed that the ciliary ring was distorted along the axis of the IOL in the "Other IOL" group. The possible reason for this distortion is that larger lenses and harder haptics deformed the ciliary ring. The results indicate that Acrysof and Acrysof Natural lenses deform the ciliary ring less than "Other IOLs" when used in cataract surgery. The "Other IOL" group also displayed greater decentration, PCO, and Soemmering's ring formation, when compared with Acrysof lenses. The lower incidence of PCO with Acrysof lenses is likely attributable to the design of the lens edge and the material itself.
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Presentation Time: 8:30 AM - 10:15 AM
Transcriptional Changes in Human Lens Epithelial Cells Secondary to Intraocular Lens Exposure
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Purpose: The epithelial to mesenchymal transition (EMT) has been previously reported to be an important step in transforming lens epithelial cells into myofibroblasts, which can cause significant visual loss in up to 20-30% of patients 2-3 years post-cataract surgery. The clinical process has been characterized as posterior capsule opacification (PCO) and few treatment options are available. The aim of this study is to characterize the transcriptional changes that occur in a human lens epithelial cell line (HLE-B3) when coated on three different types of intraocular lenses (IOLs).
Methods: The HLE-B3 cell line was used in this study. Three types of IOLs (AcrySof, Silicone, and PMMA) were evaluated. Five lenses of each type were seeded in a 24 well plate (one lens/well) and coated with $3.0x10^4$ HLE-B3 cells. The cells were allowed to coat and proliferate on the lens for one week. Media was changed every second day carefully as to not disturb the coating. The IOLs were then placed in a fresh 24 well plate, trypsinized and pooled for RNA extraction. On column DNAase digestion was performed in order to ensure no gDNA contamination. RNA concentrations were normalized to 250ng/µl and processed for cDNA synthesis. The RT^2 Profiler™ PCR Array focused for the EMT pathway (86 genes) was used to evaluate the changes between the IOLs coated cells and normal cell control.
Results: Significant results were considered when a greater than ±3-fold transcriptional change was observed. The AcrySof lens had no significant change