Symposium: Strategies and indications for customised laser refractive surgery

321-01
Technology required for customized laser refractive treatments
Jankov M
Milos Clinic Eye Hospital, Belgrade, USA

Purpose: To introduce and discuss the technology required for treatment of irregular astigmatism.
Methods: A special emphasis will be put on a platform-free reasoning in the pursue of the ideal refractive solutions by discussing different hardware solutions from various manufacturers, together with the corresponding software solutions, Many of the possible sources of errors in the data acquisition, or in any other step in the treatment chain will be identified and debated.
Results: Ablation pattern for treatment of irregular astigmatism addresses the peculiarities and irregularity of the astigmatism itself. Being unique and specific for each treated problematic eye, the correct choice of various parameters will ensure the best refractive results, as well as avoid less favourable outcomes by identifying and decreasing the errors.
Conclusion: Participants will be able to apply the newly acquired knowledge in order to recognise the requirements and limitations of the existing technology for treatment of irregular astigmatism and make the right decision in order to pursue the best possible refractive outcomes.

321-02
Customized ablations with the WaveLight Allegretto excimer laser
Pietilä J, Mäkinen P
Mehiläinen, Tampere, Finland

Purpose: We describe our experience with the WaveLight excimer laser using wavefront-guided and topography guided ablations.
Methods: We present LASIK operated cases, treated with the WaveLight Allegretto excimer laser. We describe the standard treatments, wavefront-guided customized treatments (A-CAT), topography supported treatments (T-CAT) and cases with decentrations and cases with earlier RK.

321-03
If it's not broken, don't fix it! LaserSight and CustomVis approach
Stojanovic A
University Hospital North Norway, Tromsø, Norway

Purpose: To evaluate the differences in outcomes between custom and standard treatments and to identify the factors that caused those differences.
Methods: Prospective randomized double masked trial included 120 eyes of 60 patients treated with LASIK for myopic astigmatism. One Eye of each patient was treated with custom ablation, the fellow eye with standard ablation. Registration of the optical center of the ablation to the optical center of the cornea and treatment axis registrations was used only in 'custom eyes'. Standard treatments were centered on the pupil.
Results: Six months postoperatively 50 of 60 patients were available for evaluation. Postoperative gain of lines of visual acuity was higher in 'custom group' ($P < 0.006$). There was less induction of SA and coma in the 'custom group' ($P = 0.03$), but there was no reduction of preoperative HOAs in any of the two groups. The magnitude of induction of (SA) correlated to corneal asphericity change ($R^2 = 0.75$), while the magnitude of induction of coma type HOAs correlated to amount of micro decentrations ($R^2 = 0.71$).
Conclusion: 'Prolate profile design', centration optimization and cyclotorsion registration seem to be three factors likely responsible for superior outcomes with custom ablation. A question is raised whether outcomes with standard ablation that implemented those three factors would be equally good since no reduction of preoperative HOAs was registered in custom ablation.

321-04
If it's not broken, don't fix it! – How to make treatments of virgin eyes – iVis approach
Alessio G, La Tegola MG, Passidomo F, Sborgia C
Department of Ophthalmology, Bari, Italy

Purpose: To compare the efficacy, predictability, stability and safety of transepithelial customized photorefractive keratectomy (PRK) vs. standard PRK in virgin eyes.
Methods: Ten eyes had transepithelial topographic PRK (CIPTA) and ten eyes had standard PRK with the new Ires (Ligi Tecnologie Medicali S.p.A.) ultrafast excimer laser. Data on uncorrected (UCVA) and best-corrected (BCVA) visual acuity, predictability, stability of refraction, contrast sensitivity (CSV-1000 Vector Vision) and any complications were analysed.
Results: Data on UCVA, BCVA, predictability, safety and stability of refraction were similar in both group Contrast sensitivity was better in group treated by means of CIPTA software.
Conclusion: Transepithelial customized PRK realized by means of a 1000 Hz flying-spot excimer laser provides better results, in term of quality of vision, than standard PRK.

321-05
Fixing the eye – Alcon approach
Carones F
Carones Ophthalmology Center, Milan, Italy

Purpose: To evaluate the current and future technology associated with registration and tracking when performing wavefront-guided custom ablation using the Alcon LADAR platform.
Methods: Registration using the current technology involves manual alignment of reticles and lines as landmarks for referencing the limbus and the axis of the eye both during wavefront measurement and during the treatment. Future steps involve automatic alignment and scleral blood vessels identification during wavefront measurement and treatment to compensate for cyclotorsion and avoiding pupil dilation at the time of examination.
Results: Auto-registration during wavefront measurement proved to be more accurate and reliable than manual registration. Scleral blood vessels identification and registration proved effective.
Conclusion: These new technology improvements will probably guarantee better wavefront capture and registration, thus leading to better results in terms of reducing high order aberrations.

Symposium: Strategies and indications for customised laser refractive surgery

321-06
Fixing the eye – WaveLight approach
Jankov M
Milos Clinic Eye Hospital, Belgrade, United States

Purpose: To explain the hardware and software solution behind the WaveLight approach for solving the challenging cases with customised laser refractive surgery.
Methods: In order to discuss about different hardware solutions from various manufacturers, together with the corresponding software solutions, a special emphasis will be put on a platform-free reasoning in the pursue of the ideal refractive solutions. Many of the possible sources of errors in the data acquisition, laser treatment delivery, or any other step in the treatment chain will be identified and debated.
Results: Ablation pattern design is a result of different options in the pre-operative examination and the correct decision will ensure the best refractive results, not to mention it will avoid less favourable outcomes by identifying and decreasing the errors.
Conclusion: Participants will be able to apply the newly acquired knowledge in order to recognise the requirements and limitations of the existing technology for customised laser refractive treatments and make the right decision in order to pursue the best possible refractive outcomes.

321-07
Zeiss Meditec approach
Hjortdal J
Department of Ophthalmology, Aarhus University Hospital, Århus, Denmark

Purpose: Irregular astigmatism may be corrected by wavefront or topography based ablations. In this presentation the Zeiss-Meditec based CRS-Master approach is summarised.
Methods: The Zeiss-Meditec MEL-80 excimer laser integrated with the CRS-Master program is the basis for the ablation profiles. Input data are either based on wavefront measurements (Wavefront Sciences, USA) or topography data (ATLAS, Germany). Comparisons of wavefront and topography based profiles on myopic eyes and irregular corneas are presented.
Results: Wavefront and topography based ablation profiles are different. Quantitative evaluations based on actual and simulated treatments will be presented.
Conclusion: Wavefront and topography based treatments as planned with the CRS-Master modelling tool are different. Recommendations on which modality to choose in selected cases will be presented.

321-08
A logical and sequential approach to treating irregular astigmatism – VISX system
Wang M, Swartz T
Wang Vision Institute, University of Tennessee, Nashville, TN, United States

Purpose: To devise a logical and sequential approach in treating irregular astigmatism using the C-CAP and CustomVue custom ablation modalities of VISX.
Methods: Cases of irregular astigmatism in post-refractive surgery eyes (without ectasia) are divided into the following groups: 1) Decentered ablation; 2) Small optical zone; 3) Central island; 4) Irregular astigmatism without defined patterns. General entrance criteria for all groups consist of prior refractive surgery, corresponding topographic and wavefront features, loss of BSCVA and subjective symptoms with BSCVA (but resolves with RGP). For Group 1 (decentered treatment), C-CAP method is used. A logical sequence of steps is used in treating the decentration with C-CAP. For Groups 2, 3 and 4, WavePrint aberrometry is used to capture the image preoperatively and wavefront-driven customized treatment is delivered.
Results: All eyes studies showed improvement in subjective symptoms and best corrected spectacle visual acuity, with variable degree of normalization of corneal topography and wavefront aberratomy.
Conclusion: Classification of irregular astigmatism is helpful in identifying the optimal treatment modality. A logical and sequential approach can be devised to the treatment of irregular astigmatism using C-CAP and CustomVue methods.

321-09
Fixing the eye – iVis approach
Alessio G, La Tegola MG, Sborgia C, Dima R
Department of Ophthalmology, Bari, Italy

Purpose: To evaluate the necessity of performing customized topographic ablation in eyes with irregular corneal profile.
Methods: Fifty eyes with BSCVA less than 20/25 but with pinhole visual acuity of 20/20 were enroller in this study. We performed CIPTA transepithelial PRK in all eyes, using iVis platform (pupillometer pMetrix, Ires 1000 Hz excimer laser). UCVA, BSCVA, predictability and stability of refraction, contrast sensitivity (CSV 1000 VectorVision) were analysed.
Results: UCVA improved in all patients. All the eyes had 20/20 of BSCVA. Contrast sensitivity test revealed a good quality of vision in all cases. We did not observe any complication.
Conclusion: Customized topographic PRK is a realistic approach in eyes in which corneal shape causes loss in BSCVA.

321-10
Ablation profiles for presbyopia correction – clinically meaningful?
Seiler T, Koller T
IROC, Zurich, Switzerland

Currently several ablation approaches to presbyopia are available: simple monovision, central steep island, centered steep annulus, decentered steep island, global (aspheric) optimum with and without monovision. Theoretical optical calculations of all these approaches were performed using the optic design program ZEMAX based on the Liou-Brennan model of the human eye. Only the central steep island and the global (aspheric) optimum appear to be clinically meaningful in not deteriorating the physiologic optics of the eye too much and offering sufficient near and far distance visual acuity. Clinical results of 15 patients using the global optimum with monovision will be presented. A preoperative trial by means of contact lenses is mandatory.