Corporate Perspective
Alcon

Unanswered Technical Challenges that Still Need to be Overcome

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Refractive Industry Challenges

- Diagnostic Improvement
- Optimal Laser Performance
- Corneal Factors
- Intraocular Factors
Diagnostic Improvement

■ **Today** - Wavefront driven

■ **Tomorrow** – How can other corneal attributes contribute to an optimal diagnosis & treatment?
  - Enable the surgeon to have greater control over the procedure by looking at all variables

■ Possibilities:
  - Topography!
  - Improved Wavefront
  - Pachymetry (Epith and Flap), Elasticity
  - Multiple “views” of the cornea
Optimal Laser Performance

- Flying Small-Spot Beam (Faster & Smaller)
- Advanced algorithms
  - Tissue conservation
  - Ablation time
- Tracking Technology
- Advanced Registration
  - Scleral
- Smart Nomogram development
Notable Technology Features

- High laser firing rate (multi-hundred Hz)
- Advanced laser beam control
  - Greatly reduced frequency of external calibrations
- Closed loop undilated eye tracking
- Modularity for upgrades
Impact of 50% Speed Increase*

Surgeries +4 to -10 MSRE completed in < 60 seconds

* Based on current LADARVision4000 data
Registration Requirements

- **During Measurement:** Align wavefronts to *fixed landmark*

- **During Treatment:** Realign wavefronts based on *fixed landmark*

- Adjust for intraoperative cyclotorsion
Latest Technology Advancement: Scleral Registration

Both wavefront and laser images are visible at the laser.

Scleral recognition technology identified unique blood vessels in both images.
Assisted Registration
Overlay Enhancement

- High resolution imaging
- Match to same overall image intensity profile on eye from LV

LADARWave Image

- Identify overall image intensity profile on eye from LW

LADARVision Image
Flapped Overlay Alignment

Captured Landmark Orientation  Eye Requiring Registration
Advantages to Scleral Vessel Registration

- **Improved Work Flow & Ease of Use**
  - Surgery can be performed on different days – improving patient flow
  - No marking the eye
  - No sputniks or horizontal reference line

- **Registration is Fully Automated & Fast**
  - Vessels identified during centration photo
  - Registration occurs during test track pre-flap
Where Companies Should Go With Their Laser Systems...

- More robust technology
- Enhanced features
- Automation
- Speed
- More control
- Less variability
- Easier to use
- Increased comfort: surgeon, staff, and patient
Cornea Factors

- Specific patient characteristics that influence treatment outcomes
  - Identifying what impact these have, or if they exist
- The Physical & Healing response of the eye
  - Including biomechanical changes after surgery
- The true significance of all the aberrations measured
  - Some patients see well with significant amounts of aberrations, while others do not
Smart Nomograms

- Customized laser Vision Correction
  - Physical factors
  - Biomechanical factors
  - Healing factors
- Linked with Neural Nets:
  - Utilization of Physician’s Offset Adjustment (POA)

Identify Best Nomogram
Automate Nomogram Generation
Implement Nomogram Automatically
Increased Range of Control

- No Offset
- Current Offset: +0.75 to -0.75
- Expanded Offset: +1.00 to -2.50
Intraocular Factors

- Presbyopic IOLs
  - RESTOR
  - Apodized Diffractive
  - Photic Phenomena and Safety

- Phakic IOLs
  - Alcon Acrysof Phakic IOL
  - Foldable, Flexible
  - Safety, Compression & Stability
Apodized Diffractive and Zonal Refractive. 5mm Pupil. Distant Object
Advanced Intraocular Imaging

VHF Digital Ultrasound Arc-scanning with Artemis 2

Ocular Coherence Tomography
Conclusions:

Refractive Industry Challenges:

- **Diagnostic Improvement**
  - Improved Wavefront and Corneal Measurement

- **Optimal Laser Performance**
  - Faster, Smaller, Nomograms, Registration

- **Corneal Factors**
  - Physical, Biomechanical and Healing Factors

- **Intraocular Factors**
  - Lens Safety, Optics and Stability
Thank You
for your attention!