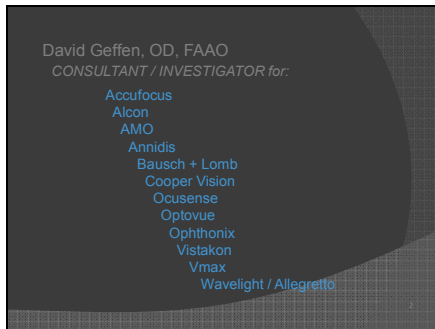


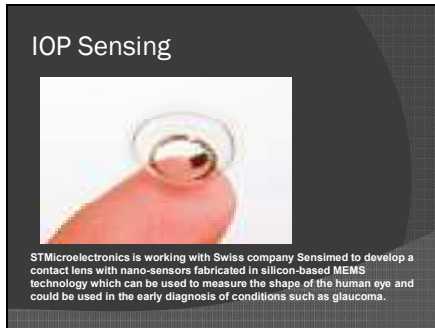
Slide 1



Slide 2




Slide 3



Slide 4


1.5 mm³ IOP Monitor

- Continuous IOP monitoring
- Wireless communication
- Energy autonomy
 - Solar cell
 - Wireless harvesting
 - Cap to digital converter
- Processor and memory
- Power delivery
- Thin-film Li battery
- MEMS capacitive sensor
- Biocompatible housing



Slide 5

Another IOP Sensing Contact Lens



These contact lenses with a pattern of conductive silver wires could be used to measure pressure inside the eye and study glaucoma. University of California

Slide 6

Contact lenses to detect blood sugar changes




Developed by biochemical engineering professor Jin Zhang at the University of Western Ontario in Hamilton, the new technology benefits from hydrogel contact lenses made from extremely small nano-particles. The nano-particles used in these lenses react with glucose molecules found in tears, causing a chemical reaction and subsequently changes in their color.

Slide 7

Photochromic contact lenses

- Nano sized tunnels that can fill with dye
- Faster response than photochromic spectacles



7

Slide 8

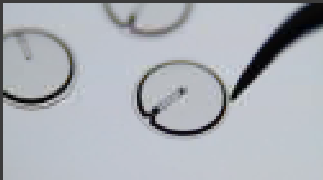
Drug dispensing contact lenses

- Ciprofloxacin release via a bandage contact lens
- Month or longer drug delivery for other medications



Slide 9

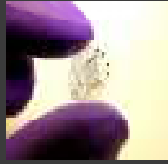
Microsoft and UW



Microsoft and the University of Washington are developing an electronic contact lens that can non-invasively monitor and wirelessly report blood sugar levels.

Slide 10

Virtual and Augmented Reality Contact Lenses



Researchers at the University of Washington are incorporating micro-circuitry for augmented reality applications. Diffraction is expected to limit the scope of the application.

Slide 11

Pain: Media Bottleneck

Screen too small for rich content

Narrow Field of View

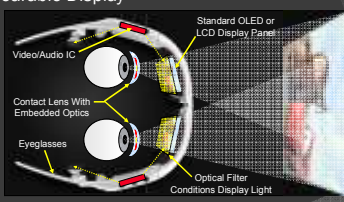
Unattractive Styling

Excessive Bulk



Slide 12

Solution: Contact Lens Enabled Wearable Display



Video/Audio IC

Contact Lens With Embedded Optics

Eyeglasses

Standard OLED or LCD Display Panel

Optical Filter


Conditions Display Light

Slide 13

Innova Inc. iOptik™ Contact Lens

Outer lens sharpens view of normal surroundings (50% of population need corrective lenses)

Center lens streams HD/3D Digital Media from eyewear flat-panels or projectors




Outer Lens

Center Filter

Center Filter & Display Lens

Slide 14


VMAX IN PRACTICE
David I. Geffen, OD, FAAO



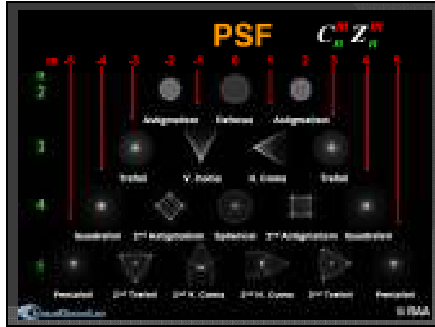
Slide 15

Refraction

- Over 100 years the same method
- Confusing for the patient
- Inaccurate
- Low Tech



Slide 16



Slide 17




Slide 18



Slide 19


Practice Benefits

- High Tech Look and Feel
- Get out of the Dark Ages
- Patients hate "Which is Better, One or Two"
- Greater Reliability



Slide 20

Results



Widom & Weiss logo

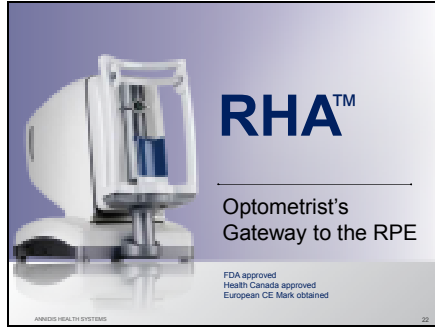
Slide 21

Patient Responses

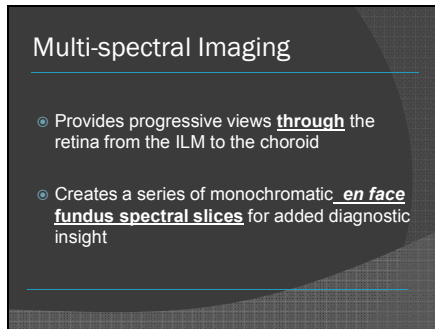
- Easier to tell the difference
- High tech
- Less strain
- Feels more accurate



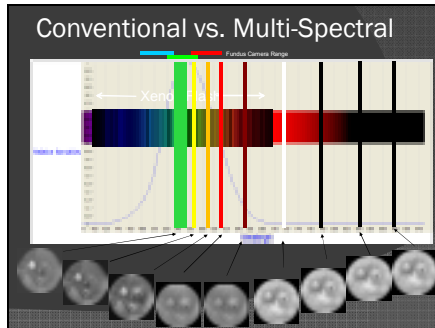
Slide 22



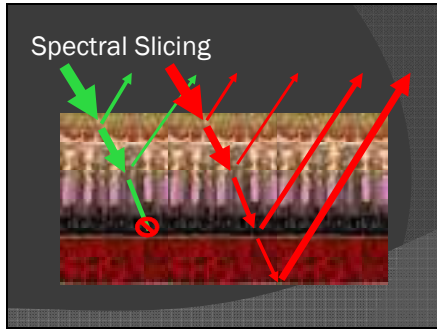
Slide 23



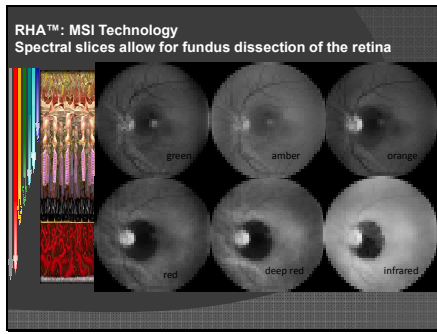
Slide 24



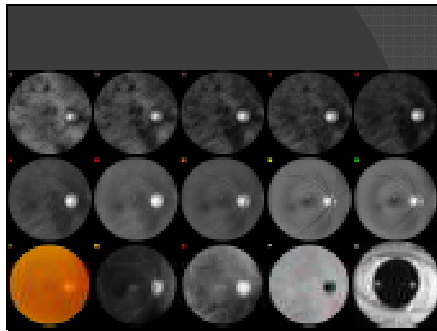
Slide 25



Slide 26



Slide 27

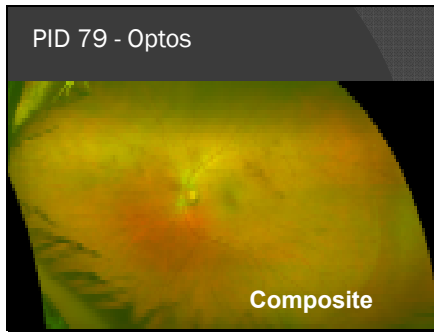


Slide 28

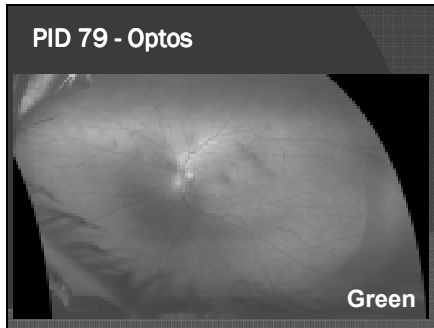
RHA™: MSI enables a spectral dissection for localization and interpretation of retinal pathologies

| Monochromatic Light Sources | Examples of Structures Best Viewed with MSI |
|--|--|
| Greens Superficial Structures Highlighted | Epiretinal membranes, tractional forces, cysts, folds |
| Yellows Ambers Reds Mid Retinal Structures Highlighted | Retinal vasculature, haemorrhages, neovascular membranes, drusen, exudates |
| Deep Reds Infrareds Deep Retinal Structures Highlighted | RPE architecture, pigmentary anomalies, nevi, melanomas |

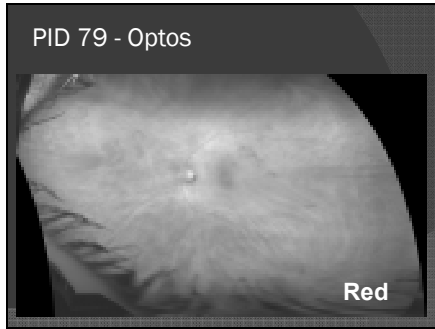
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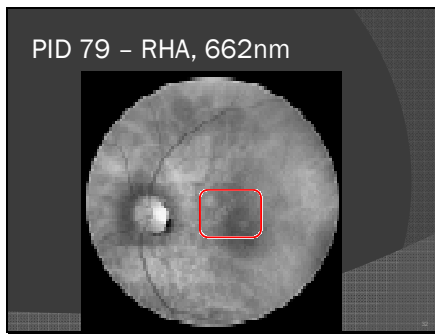
Slide 30



Slide 31



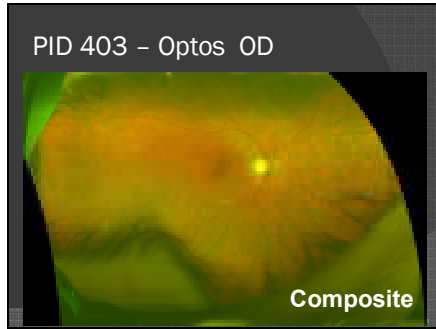
Slide 32



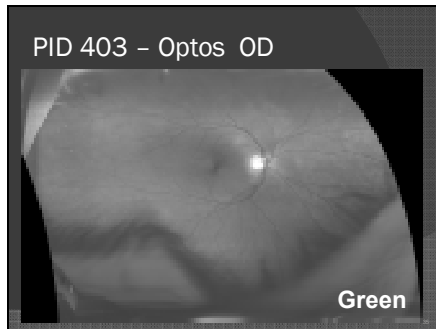
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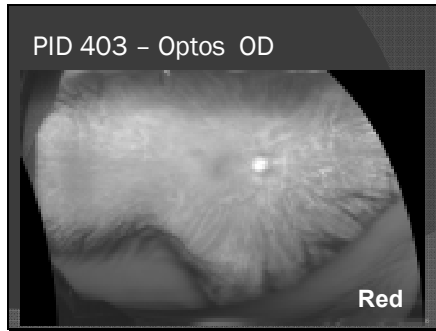
Slide 34



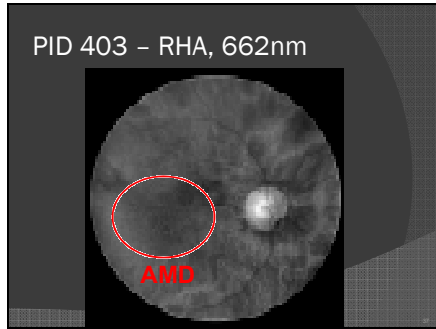
Slide 35



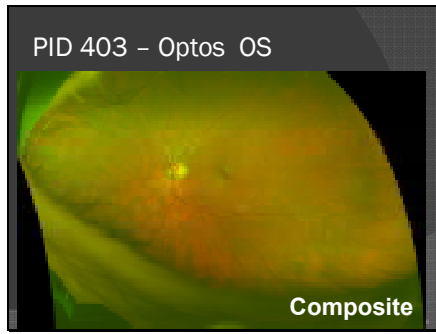
Slide 36



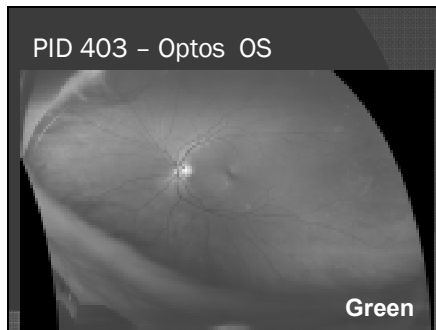
Slide 37



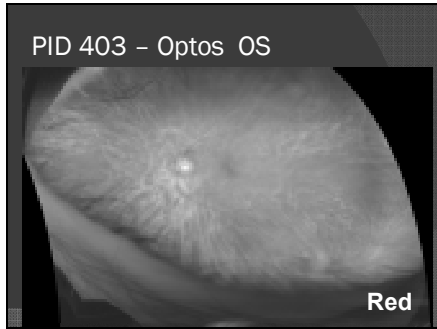
Slide 38



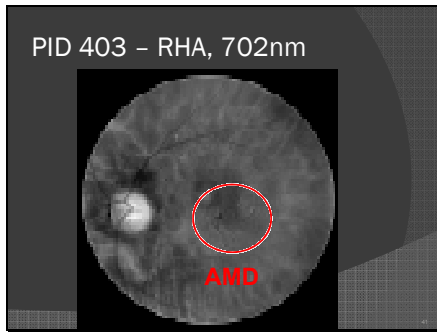
Slide 39



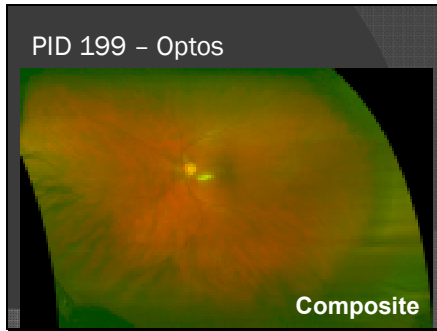
Slide 40



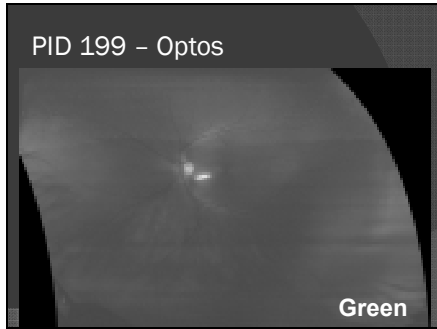
Slide 41



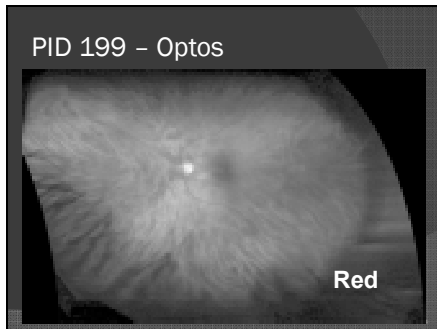
Slide 42



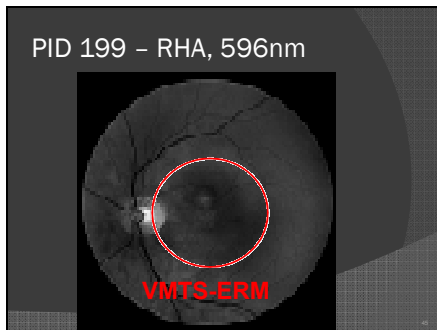
Slide 43



Slide 44



Slide 45



Slide 46

Return on Investment

- To date, 18% of my patients screened on the RHA have had suspect areas of interest to pursue further. This has drastically increased the utility of my OCT and I am now selling 4 times more nutraceuticals.

Dr.
David Geffen

Slide 47



Slide 48

Technology Overview

- Revolutionary tear collection
 - Non-invasive
 - Gives access to untrained users (CLIA waiver)
 - Integrates into technician workflow
- Novel lab-on-a-chip
 - Less than 50 nL required
- Platform for rapid electrochemical biomarker assays
 - Sample-to-Answer in less than 30 seconds

Slide 49

Tears as an *in vitro* Diagnostic Platform

- Tears are an ideal matrix for non-invasive testing
 - Derived from blood
 - Largely acellular
- Tears known to have thousands of proteins & genes
 - Potential for many ophthalmic & non-ophthalmic markers
- Biomarker normalization using osmolarity
 - Fundamentally corrects for tear film instabilities
 - More accurate reporting of proteins, genes, metabolites
 - Combines multiple markers & payments on a single chip

Slide 50

Tear Hyperosmolarity- the Central Mechanism Causing Ocular Surface Inflammation, Cell Damage and Symptoms in Dry Eye Disease
DEWS Report, 2007

Tear hyperosmolarity stimulates a cascade of inflammatory events

- Inflammatory tear cytokines and MMPs*
- Apoptotic cell death*
- Reduced and altered tear mucins*
- Reduced lubrication*
- Up-regulation of HLA-DR expression on surface cells*
- Disruption of epithelial junctions*
- Intra-cytoplasmic changes in surface cells*

Osmolarity tracks severity of disease linearly and tracks response to therapy and is tightly linked to tear film instability

Slide 51

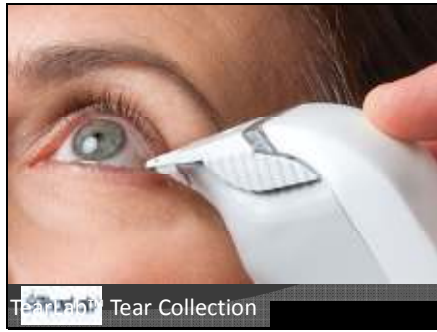
Using Tear Osmolarity in the Diagnosis of Dry Eye Disease

- If one or both eyes ≥ 308 mOsm/L or larger than a 2 mOsm/L difference between eyes
- Normal subjects have a tight band of variability
- Patients with mild/moderate DED show variability
 - **Variability is the hallmark of this stage** in which compensatory mechanisms are still operative in response to environmental stress
 - **Variability confirms [rather than](#) confounds the DED diagnosis**
 - Am J Ophthalmol 2011 May
- Patients with moderate to severe DED have tear osmolarity which varies between eyes and over time but generally remains elevated within the abnormal range

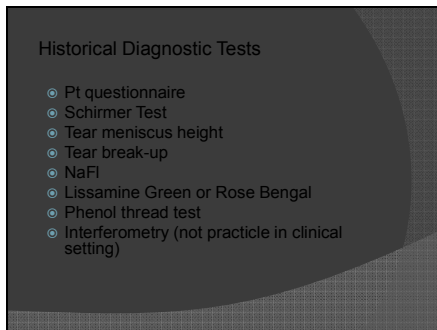
Slide 52



Slide 53



Slide 54



Slide 55

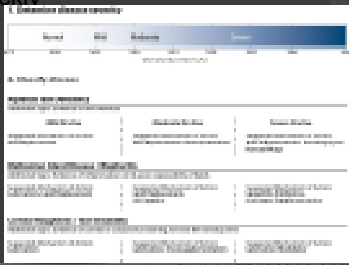
Osmolarity in the Diagnosis of Dry Eye Disease

| Clinical Test | PPV |
|-----------------|-----|
| Osmolarity | 87% |
| Schirmers | 31% |
| TBUT | 25% |
| Staining | 31% |
| Meniscus Height | 33% |

- Osmolarity is the "gold standard" test for Dry Eye Disease
 - 45 years peer reviewed research
 - Osmolarity has been added to definition of Dry Eye
 - Global marker of Dry Eye, indicating a concentrated tear film

Slide 56

Diagnose & Classify Patients Quickly



The screenshot shows a software interface with a navigation bar at the top containing 'Home', 'Menu', 'Reports', and 'Tools'. Below the navigation bar, there are several sections with text and data, likely representing patient information and diagnostic results. The interface is organized into a grid-like structure with various fields and labels.

Slide 57

ORA System™: Designed to Optimize Every Cataract Procedure



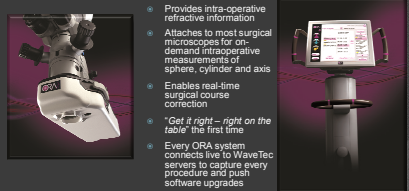
ORA's all new Optwave™ technology takes intraoperative wavefront aberrometry to a *new level of precision* providing surgeons a *higher level of confidence*.

ORA (Optwave Refractive Analysis)

Slide 58

ORA System™ (Optiwave™ Refractive Analysis)


- Provides intra-operative refractive information
- Attaches to most surgical microscopes for on-demand intraoperative measurements of sphere, cylinder and axis
- Enables real-time surgical course correction
- "Get it right – right on the table" the first time
- Every ORA system connects live to WaveTec servers to capture every procedure and push software upgrades



Slide 59

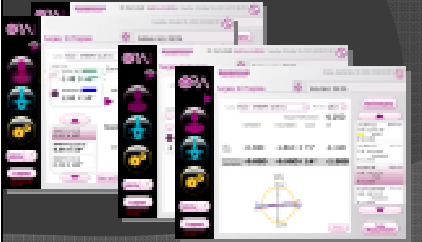
ORA System™ Helps Surgeons Optimize Outcomes for ALL Cataract Patients

- IOL power calculations using aphakic refraction
 - Guides IOL selection
 - Post-refractive IOL power calculations
 - Standard monofocal and aspheric IOLs
 - Presbyopic IOLs
 - Toric IOLs (SE power)
 - Guides toric IOL cases
 - Cylinder power & axis
 - Guides LRI cases
 - Whether done in the phakic, aphakic, and/or pseudophakic mode

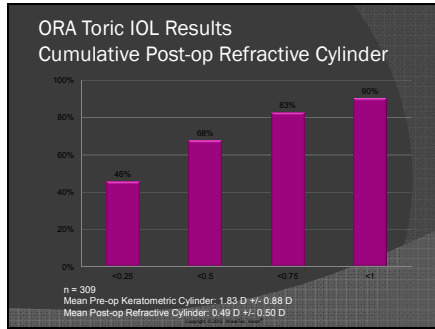


Slide 60

Sample ORA Screen Shots



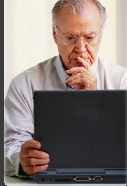
Slide 61



Slide 62

Today's Modern Cataract Surgery

Is it really refractive?



Only **50%** of cataract patients get within 0.50 D of attempted correction*


* Reported average of published studies

Slide 63

ORA System™

Enables Refractive Outcomes

While **Over 80%** of ORA patients get within 0.50 D of attempted correction



Slide 64

What to Expect After Surgery – Day One

The vast majority of patients will be seen by the surgeon at day one, but if not:

- Look for a quiet anterior chamber
- Continue prescribed therapy (e.g., antibiotics, steroids, NSAIDs)
- Check ocular surface


Slide 65

LASER REFRACTIVE CATARACT SURGERY

Slide 66

Traditional Cataract Surgery

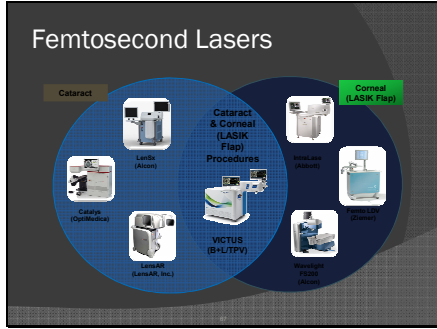
- Capsulotomy size directly related to Effective Lens Position^{1,2}
- Corneal incisions are manually executed and imprecise
- High level of phaco power can be associated with post-op complications
- Cataract surgery complications are 10x that of LASIK^{3,4}



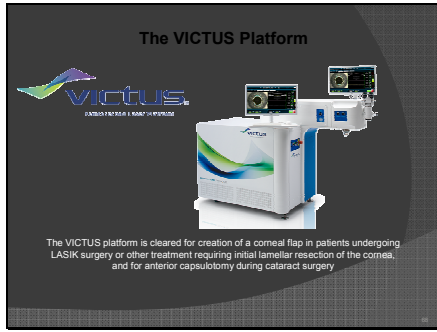
| Common | Incidence | Vision Threatening | Incidence |
|-----------------------------------|-----------|------------------------------------|-----------|
| Posterior Capsular Opacification | 10-30% | Retinal Detachment | 0.6-1.7% |
| Cystoid Macular Edema (transient) | 2-10% | Cystoid Macular Edema (persistent) | 1-2% |
| Vitreous Loss | 1-5% | IOL Malposition | 0.3% |
| Corneal Endothelial Cell Loss | 4-10% | Need for Corneal Transplant | 0.3% |
| | | Endophthalmitis | 0.1% |

1. Nishiyama S. Sources of error in intraocular lens power calculation. J Cataract Refract Surg. 2009 Mar;36(3):388-96.
2. Ditzel G, Steinhilber C. The relationship between capsulotomy size and anterior chamber depth reduction. Ophthalmic Surg Lasers. 1999 Mar;28(3):185-90.
3. Pendergrass J, et al. Ophthalmic Surg Lasers Imaging. 2010 Oct;40(5):705-10.
4. Park K, et al. Ophthalmic Surg Lasers Imaging. 2010 Mar;40(1):225-41.

Slide 67



Slide 68



Slide 69



Slide 70

The LenSx[®] Laser

The LenSx[®] Laser

A dynamic platform technology that will:

- Deliver true refractive cataract surgery with the precision of a femtosecond laser
- Establish Laser Refractive Cataract Surgery - a viable new premium category
- Rapidly advance the evolution of true image-guided intraocular surgery
- Advance the development of a more digitized, predictable approach to lens replacement surgery



Slide 71

Laser Refractive Cataract Surgery

Goal is to Improve Every Procedure, Technology and Surgeon

| Key Step | Current Surgery | Impact | Safety Impact |
|--------------------|------------------------------|--|---|
| Cornial Incision | Not Optimized | Incorrect Cylinder | Infection |
| Capsulorhexis | Variable Sized, Not Centered | Variable IOL Position & Effective Lens Power | Capsular Tears, Posterior Capsule Opacification |
| Lens Fragmentation | Explosive Ultrasound Power | Dilates Retinal Recovery | Lots of Endothelial Cells, Capsule Rupture |

Slide 72

LenSx[®] Laser Integrated OCT

Image-guided Laser Refractive Cataract Surgery

- Intuitive touch screen Graphic User Interface
 - for easy customization of all surgical parameters
- Real-time video imaging for 3D visualization
 - guides the surgeon while docking
 - for optimal surgeon control
- True image-guided surgical planning
 - enables the surgeon to precisely program size, shape, location of each incision

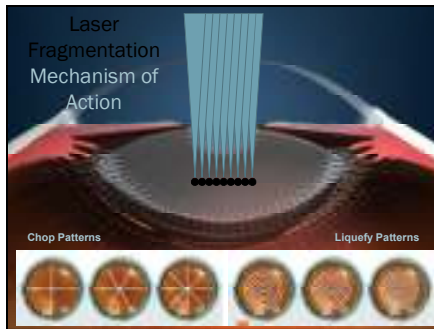
Slide 73

Traditional Lens Fragmentation

- Initial phaco technique divides the nucleus into quadrants (Divide and Conquer)
Endothelium effects
- Variations on this technique were developed to reduce phaco power
Chop, Quick Chop, Stop and Chop, Flip, etc.
- Difficult to perform
- Lens density dependent

Slide 74

Laser Fragmentation Mechanism of Action



The diagram illustrates the laser fragmentation mechanism of action. It shows a cross-section of an eye with a lens nucleus being fragmented by a laser. The laser beams are shown as a series of vertical lines hitting the nucleus. Below the main diagram, there are two rows of circular images labeled "Chop Patterns" and "Liquefy Patterns".

Slide 75

Manual Clear Corneal Incisions

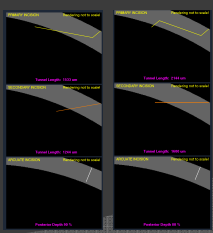
- Wound architecture limited by hand-held instruments, manual incisions
 - imprecise tunnel length and geometry
- Frequently require stromal hydration to seal
- Can result in cascading intraoperative difficulties
 - fluid control, anterior chamber maintenance
- Recent literature suggests an increased incidence of post-op infection¹
- Incisions may be unstable at low IOPs²

¹ Taban M, Behrens A, Newscomb RL, Nobe MY, Sardi G, Sivvel PM, McDonnell PJ. Acute endophthalmitis following cataract surgery: a systematic review of the literature. *Arch Ophthalmol*. 2005 May;123(5):613-20.
² Behrens A, Stark WJ, Prator KA, McDonnell PJ. Dynamics of small incision deep corneal wounds after phacoemulsification surgery using optical coherence tomography in the early postoperative period. *J Refract Surg*. 2008 Jan;24(1):46-9.

Slide 76

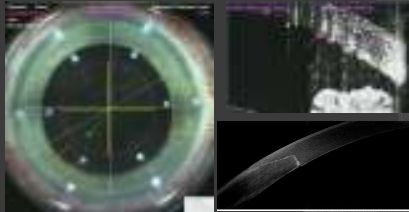
Incision Configurations Single or Multiplane

- ⦿ Computerized programming of incision patterns
- ⦿ Customizable geometry
 - Angle
 - Depth
 - Width



Slide 77

LenSx® Laser Corneal Incisions



Customized wound architecture and placement Self-sealing incisions

Slide 78

Arcuate Incisions

Traditional, Handheld Diamond Knife

- ⦿ Manually executed by "tracing" corneal marks
- ⦿ Inconsistent depth control
- ⦿ Unpredictable effect due to imprecise wound architecture and depth
- ⦿ No image-guided surgical planning or visualization




Slide 79

LenSx® Laser Arcuate Incisions

Image-guided surgical planning with 3D visualization

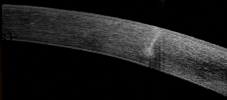
- Real time corneal thickness
- Computer programmed incisions
 - % depth
 - incision length and position
 - 3D visualization of incision placement
- Predictable incision width, tunnel length
- Titrateable incisions
 - adjustable during surgical procedure
 - adjustable post-op at slit lamp



Slide 80

Laser Arcuate Incision

- Square edge
- Uniform depth (no ripple)
- Precise, reproducible
 - Arc shape
 - Arc length
 - Diameter



Slide 81

Ideal Capsulorhexis

- Reproducible size, shape and well-centered


Current Manual Capsulorhexis

| Too large | Too small | Irregular shape | Off center |
|------------------------|--------------------------|------------------|--------------------------|
| No capsule-IOL overlap | Phimosis | IOL tilt | IOL decentration |
| IOL tilt | Difficult phaco maneuver | IOL decentration | Edge catches visual axis |

Slide 82

LenSx® Laser Capsulorhexis

- Reproducible, Precise Circular Shape and Diameter Capsulotomy
- Enables Image-Guided Centration of Capsulotomy



Slide 83

Effective Lens Position (ELPo)

- Assumed value, from empirical data (A constant and surgeon factor)
- A significant source of IOL power error, (Norby, 2008) key to post surgery refraction (Hill, 2009)
- Size of capsulorhexis affects ELPo (Cekic, 1999)

Slide 84

Patient Expectation

LenSx® Laser technology provides the patient:

- Perceived benefits of a laser procedure
 - Computer controlled precision
 - Procedural predictability
- A comprehensive, advanced technology approach to lens replacement surgery
- A truly premium, value-added surgical experience

Slide 85

Practice Performance

LenSx® Laser technology provides the surgeon:

- Known benefits of femtosecond technology
 - Improved accuracy of all incisions
 - Predictability at every step
- True image-guided intraocular surgery
 - Opportunity to create optimal wound architecture
 - Precise capsulotomy design for every IOL
- A strong value proposition
 - A message that easily resonates with patients and staff

Slide 86

Standard-Of-Care Technology

Light Adjustable Intraocular Lens (LA®)
Developed by Colhou Vision, Inc.



- Photosensitive Silicone Material
- Precise, Non-Invasive Post-Operative Adjustments
- ≥2 Diopter Correction for Myopia, Hyperopia, or Astigmatism
- Non-Toxic, Biocompatible
- Foldable


Slide 87

Why the Light Adjustable Lens?

- Predictable correction of residual refractive error *after* lens implantation for optimal distance vision
 - Spherical and cylindrical errors up to 2D
- Customized presbyopia solutions for near and intermediate vision
 - Adjustable Monovision
 - Customized Near Add
 - Asphericity Control


Slide 88

Light Adjustable Lens



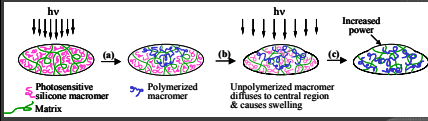
• Foldable 3-piece silicone IOL
• Blue PMMA modified-C haptics
• 6.0 mm biconvex optic
• Overall length 13.0 mm
• Manufactured in range from 10.0 D to 30.0 D
• (+17.0 D to +25.0 D in 0.5 D steps)

+21.0 opt, +1.0 -1.0/90°



Slide 89

Mechanism of Power Adjustment



hv

(a) Photosensitive silicone macromer Matrix


(b) Polymerized macromer

(c) Unpolymerized macromer diffuses to central region & causes swelling


Increased power

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Light Delivery Device Customized Treatment

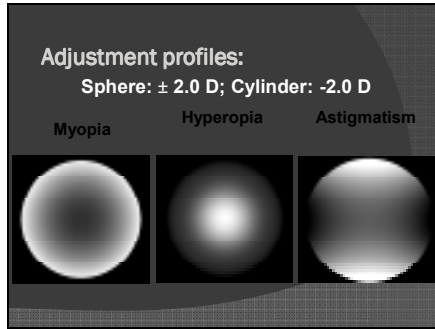


• Standard slit-lamp footprint
• Unlimited flexibility for lens modification
• The heart is the digital mirror device (DMD), which allows customized generation of spatial irradiance profiles

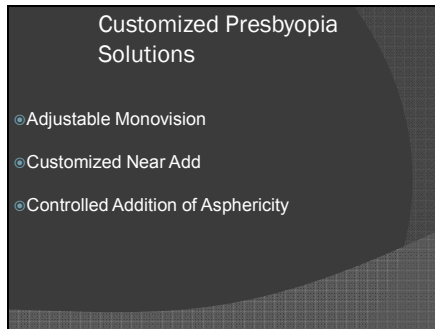


~14 μm

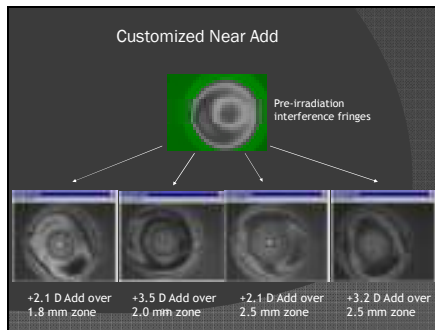
Slide 91



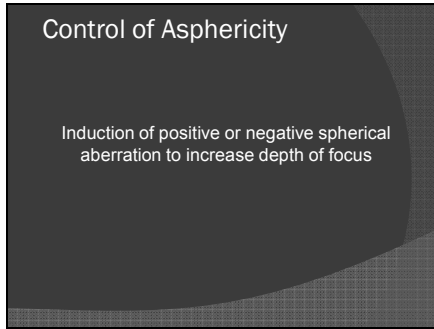
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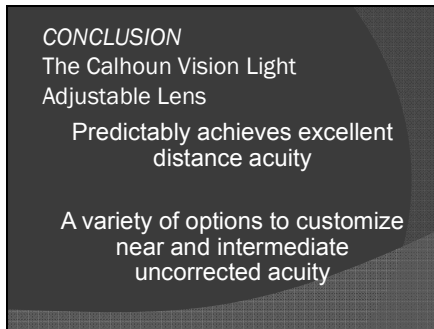
Slide 93



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Slide 95



Slide 96

