

## Overview of Cataract Surgery: A Refractive Procedure

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## Our Strive Towards Perfection

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- Our goal is to meet our patients expectations
- Expectations of our patients are constantly rising
- Technological improvements and advances
- Media/Press/Internet
- Demands of our society

## "Baby Boomers"

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- Generation with high expectations
- High levels of activity
- Do not accept limitations with vision (Presbyopia)
- Do not want to get older
- The "bar" has been raised



## Patient Expectations:

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- Excellent vision
- Immediate results
- Pain free
- Without side effects

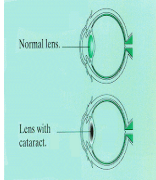
## Surgical Goals:

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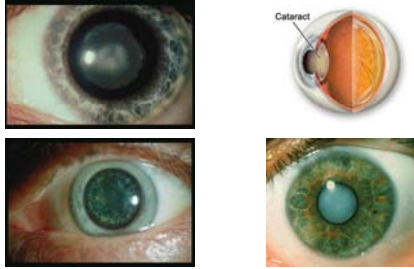
- Proper patient selection
- Education of patients - expectations and limitation of surgery, options
- Identify and treat underlying conditions that may limit our surgical results
- Meticulous surgery

### Cataract

- A clouding of the natural lens
- Normal part of aging
- Bilateral, may vary
- Severity varies with each individual, eye
- May be associated with: birth, medications, trauma, medical conditions

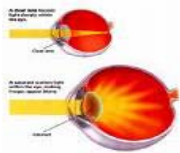


### Cataracts



### Cataract


- The natural lens of the eye focuses light
- As the lens ages, it begins to "discolor"
- As the lens becomes "cloudy", it no longer can focus the light sharply, leading to the symptoms associated with cataract formation



### Symptoms Associated with Cataracts

- Blurred vision
- Double vision
- Glare and haloes around lights
- Difficulty with reading or making out signs
- Increased sensitivity to the sun or lights
- Dimness
- Blunting of colors

### Effects of Cataracts



### What to Do?

- As long as a person is able to carry on their normal daily activities – no treatment is required
- When one can not function comfortably with their normal daily activities (driving, reading, etc.) – Consider surgery
- Typically a change in glasses only helps when the cataracts are small, later on a change does not help.

## Cataract Surgery

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- Medical Indications:
  - after trauma damage to the lens
  - dense cataract limits view of posterior pole pathology (macular degeneration, diabetic retinopathy etc..)

## Cataract Surgery

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- The most commonly performed surgery in the United States
- Market Scope – 3 million cases in 2007 and 2008
- The goal of the surgery – replace the “cloudy” natural lens with an intra ocular lens implant

## Cataract Surgery

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- Many changes/transformations
- Procedure of last resort to procedure of choice
- Limited vision and extended recovery to immediate restoration of excellent vision

## Transformation of Cataract Surgery

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- 1. Surgical Techniques
- 2. Intra Ocular Implants
- 3. Surgical Equipment and Devices

## Surgical Techniques

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- Intra Capsular Cataract Extraction – Aphakia
- Extra Capsular Cataract Extraction
- Phacoemulsification
- Astigmatism Correction

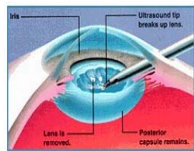
## Extracapsular Cataract Surgery

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- Most commonly performed in 1980-1990's
- Large incision
- Cataract removed manually
- Sutures required
- Limited activity – bending, protection of eye
- Prolonged healing – 6-8 weeks
- Needed to remove the sutures

## Phacoemulsification

- Ultrasonic power “breaks down” the cataract
- Very small incision is made – no sutures
- Quicker healing
- Vision restored within days
- No restrictions in activities immediately



## Intra Ocular Lens Implants

- Anterior Chamber
- Iris Fixed
- Posterior Chamber Lenses – large
- Posterior Chamber Lenses – foldable
- Astigmatism Correcting
- Presbyopia Correcting
- Phakic Lenses

## What About the Difficult Case ?

Technological Advances with Instrumentation and Materials can Convert a “Difficult Case” into a Routine One !

## Poor Dilation

- Can lead to difficulty
- Increased complications
- Associated syndromes or conditions that increase risk of complications
  - Flomax – alpha-1 adrenergic receptor antagonist
  - Pseudoexfoliation
  - Associated with prior ocular inflammation

## Poor Dilation

- Pharmacologic :
  - Nsaids pre operative
  - Topical phenylephrine 10%
  - Intracameral epinephrine

## Poor Dilation

- Pharmacologic :
  - Nsaids pre operative
  - Topical phenylephrine 10%
  - Intracameral epinephrine
- Viscoelastics : Viscoat, Healon 5

### Poor Dilation

- Mechanical Devices to Physically open and maintain the pupil opening
  - Stretch – Kuglen, collarbuttons, Beehler pupil dilator etc.
  - Iris hooks
  - Morcher ring, Malyugin ring, etc.

### Poor Red Reflex

- Required in order to allow visualization of the phacoemulsification
- Dyes – Trypan Blue
  - Lumera microscope – Xenon light

### Lens Implants

- They provide the power to focus
- Different power lenses correct vision to achieve different goals
- In past goal was to correct for distance, require reading glasses
- New generation of lenses- Presbyopic correcting lenses provide full range of vision
- Astigmatism correcting lenses



### Presbyopic Correcting Lenses

- Intraocular lens implants designed to give the patient “full range” of vision in a post operative setting
- Multiple designs by different companies
- Goal is to minimize the dependence on spectacles or contact lenses after cataract or clear lens surgery

### Presbyopic Correcting Intraocular Lens Implants

- Restore - Alcon
- Array - AMO
- Rezoom - AMO
- Technis – AMO
- Crystalens – Eyeonics/B&L

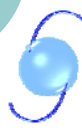


### Refractive Results with Cataract Surgery

- Cataract Surgery a form of Refractive Surgery
- Excellent results with monofocal intraocular lens implants. Acrylic, Silicone or PMMA.
  - Monofocal setting – distance mostly, near in myopes
  - Monovision


## Current Presbyopic Correcting Lenses

### The IOL Portfolio

IOL's come in many sizes, shapes & materials.  
Each has unique characteristics & capabilities

Single Power Lenses	Multifocal/Defractive Lenses	Accommodating Lens
 <ul style="list-style-type: none"> <li>Corrects only distance vision</li> <li>Does not accommodate in eye</li> <li>Glasses required</li> </ul>	 <ul style="list-style-type: none"> <li>Multiple, fixed focal points</li> <li>Does not accommodate</li> <li>Must find appropriate focal point</li> <li>Extensive neurological adaptation</li> </ul>	 <ul style="list-style-type: none"> <li>Single focal point</li> <li>Full range of distance, intermediate &amp; near vision</li> <li>Uses eye's natural focusing mechanism</li> <li>Rapid visual recovery</li> </ul>

### Anatomy of the Apodized Diffractive IOL





Step heights increase peripherally from 1.3 - 0.2 microns

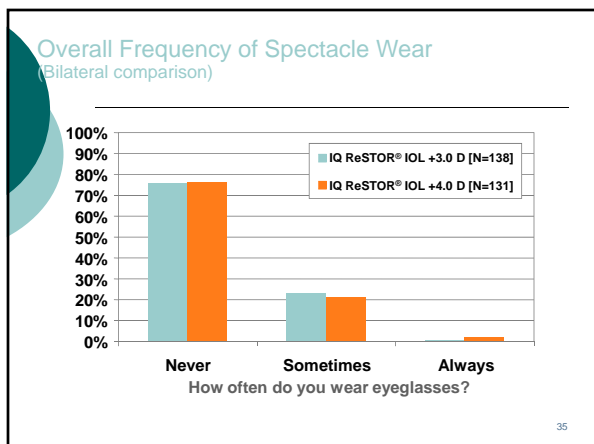
Central 3.6 mm diffractive structure

A +4.0 add at lens plane equaling +3.2 at spectacle plane

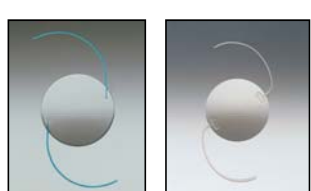
### AcrySof® IQ ReSTOR® IOL

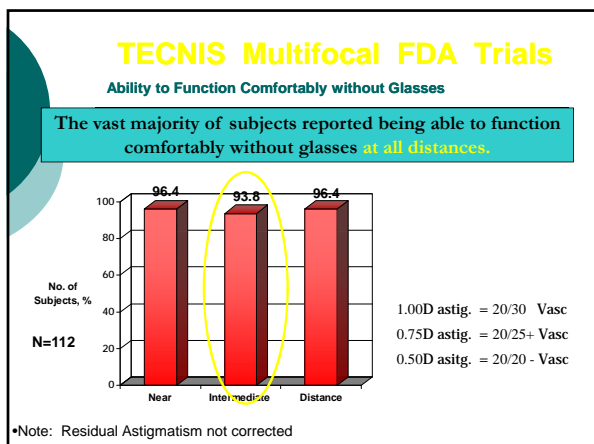
 <p><b>SN6AD3</b> Add Power: <b>+4.0 D</b> Spectacle Plane: +3.2 D Range: +10.0 D to +34.0 D A-Constant: 118.9</p>	 <p><b>SN6AD1</b> Add Power: <b>+3.0 D</b> Spectacle Plane: +2.5 D Range: +10.0 D to +34.0 D A-Constant: 118.9</p>
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### TECNIS® Multifocal IOL





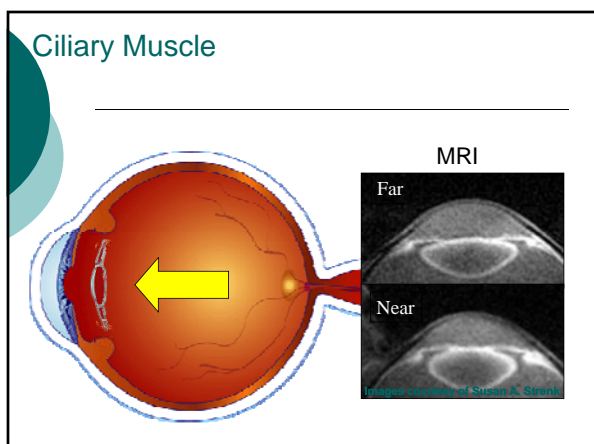
- ### Multifocal Lenses
- Multiple focal points viewed at one time
  - Adaptation required – may take weeks to months, improves after second eye surgery
  - May require glasses for intermediate or near functions
  - Night complaints due to multifocal images with larger pupils

### Crystalens

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Eyeonics/B&L

- ### Crystalens
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- Accommodating intraocular lens
  - Mechanism – The lens-haptic juncture shifts allowing “accommodation”. Requires activity of the ciliary muscle.
    - There is only one focal length but it shifts
    - Increased depth of focus due to it’s posterior positioning
  - There is a learning curve, the patient needs to learn how to accommodate with this lens in place



- ### Patient Selection
- #### Pre-operative Exclusion Criteria
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- Subjective Exclusion
    - Hypercritical patients
    - Patients with unrealistic expectations
    - Occupational - night drivers, pilots
    - Unmotivated patients

### Pre Operative Evaluations:

- Meticulous Biometry measurements required
- IOL Master
- Immersion Ultrasonography
- Topographic analysis/ multiple keratometry readings
- Multiple IOL formulas

### Patient Discussions:

- Expectations
- Alternatives
- Financial Implications
- Side Effects
- Bilateral Need for surgery
- Neuro Adaptation – may take months

### Premium Lenses

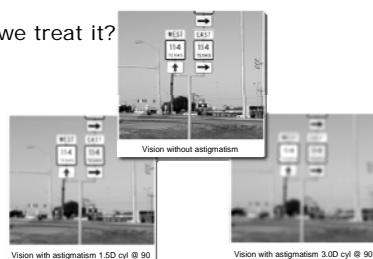
- Patients can not tolerate residual refractive errors (spherical or astigmatic)- Multifocal lenses
- Poor quality of vision – haloes, glare, vague complaints, etc.
- Must be able to perform enhancements
  - LRI/AK – astigmatism
  - Laser vision correction
  - IOL exchange or piggyback lens

### Astigmatism

- Focusing ability of the eye is different at different axes
- Effected by the cornea and natural lens
- Once the natural lens is removed – cornea is the only factor
- Cataract surgery is essentially neutral in it's astigmatism effect

### So What About Astigmatism?

How do we treat it?



### Surgical Correction of Astigmatism - Procedures Available

- Limbal Relaxing Incisions – procedure of choice
- Astigmatic Keratotomy
- Laser Vision Correction –if assoc. with spherical error
- Intraocular Lens Implants

### Surgical Incisions to Correct Astigmatism

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- Corneal incisions lead to a flattening effect
- Identify the steep axis on corneal topography
- Incisions made on axis of (+) cylinder
- Effect depends on age of patient, depth and length of incision and number of incisions made

### Surgical Incisions to Correct Astigmatism

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- Cataract Surgery – Astigmatism is based only on keratometry
  - Easy to perform – patient is anesthetized, in operative setting
  - Takes short length of time
  - Topical setting

### Limbal Relaxing Incisions

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- Useful in correcting up to 2 to 2.5 diopters of astigmatism
- Require a diamond blade – 600 micron depth
- Lack of side effects
- Can be performed at the time of cataract surgery or as an independent procedure

### Astigmatic Keratotomy

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- Performed on the cornea
- Requires pachymetry measurements of the cornea at sites of the incisions (7.0mm oz)
- Diamond blade – set at 90-100% depth
- Can correct very large amounts of astigmatism

### Astigmatic Keratotomy

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- Never incise greater than 90 degrees
- Can cause irregular astigmatism
- Can produce glare
- Incisions can cause discomfort



### Intraocular Lens for the Correction of Astigmatism

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- Alcon and Staar
- Toric Intra Ocular Lens Implants
- Predictable
- Standard Cataract Surgery + Alignment of the Lens in the axis of the astigmatism

## AcrySof® IQ Toric IOL Specifications

Model Number	SN6AT3, SN6AT4, SN6AT5
Optic Diameter	6.0 mm
Overall Length	13.0 mm
Optic Type	Biconvex Toric Aspheric Optic
IOL Powers <small>(spherical equivalent dioptries)</small>	+6.0 to +30.0 D
IOL Cylinder Powers	1.50 D, 2.25 D, and 3.00 D
Haptic Angulation	0 degrees (planar)
Haptic Configuration	STABLEFORCE® modified L haptic
Suggested A-Constant	119.0 <sup>1</sup>
Refractive Index	1.55
Light Filtration	UV and Blue Light

Provided as a guideline only.

## AcrySof® IQ Toric IOL Calculator

Makes precise surgical planning easy!

### Intuitive input

- › Patient data
- › Keratometry
- › IOL spherical power
- › Surgically induced astigmatism
- › Incision location

### Powerful output

- › Recommended IOL model and spherical equivalent power
- › Optimal axis placement
- › Magnitude and axis of anticipated residual astigmatism



## Wave Tech - Orange

- Intra operative technique to measure amount and direction of astigmatism
- Allows for intra operative modifications of treatment
- LRI – length and locations of astigmatism
- Toric IOL - alignment

## Conclusion : Cataract Surgery

- Medical and Technological advances – successful procedure
- Improve the quality of a patient's life
- Eliminate or minimize the need for spectacle correction

## Conclusion : Cataract Surgery

- Safe
- Predictable
- Quick
- Painless
- Immediate results
- #1 performed surgical procedure in the USA

Thank you