In modern cataract surgery, freedom from spectacles is becoming more and more important.

To select a patient for Multifocal IOL, One Diopter of Astigmatism is the maximum permissible amount.
History of Toric and multifocal IOLs

History of Toric IOLs

- 1994 the first Toric foldable, through 3.2mm.
- Since 1996 advancements in Toric IOLs to improve rotational stability which is the commonest complication in Toric IOLs
Ten Brands of toric IOLS are present in the market

1- Acrysof (Alcon) : (Hydropobic).
2- AF-1 toric (Hoya): (Hydrophobic with PMMA haptic)
3- Acricomfort (Zeiss) (Hydrophilic).
4- Lentis Tplus (Ocuolentis) (Hydrophiclic).
5- Light adjusatable (silicone with PMMA).
Ten Brands of toric IOLS are present in the market:

6- Microsil/torica (Human optics).
7- Morcher 89 A (Silicone with PMMA haptic)
8- Staar surgical (Silicone)
9- T flex (Rayner) (Hydrophilic)
10- Tecnis Toric (Abott) (Hydrophobic)

Four Brands of Toric Multifocal IOLs are present in the market:

- Acrysof Restor Toric IOL (Hydrophobic).
  - Acrylisa Toric (Zeiss), (Hydropilic).
  - M flex (Rayner), (Hydropilic).
  - Lentis- M plus (Hydropilic).
AcrySof® IQ Toric

Quality of vision is deteriorated considerably by astigmatism

No astigmatism  1.0 D astigmatism  2.0 D astigmatism
Enhanced image quality:
- Decrease spherical HOA.
- Increased CS

Corrects variable degrees of astigmatism

AcrySof® IQ Toric IOL Specifications

<table>
<thead>
<tr>
<th>Model Number</th>
<th>SN6AT3</th>
<th>SN6AT4</th>
<th>SN6AT5</th>
<th>SN6AT6</th>
<th>SN6AT7</th>
<th>SN6AT8</th>
<th>SN6AT9</th>
</tr>
</thead>
<tbody>
<tr>
<td>IOL Plane</td>
<td>1.5 D</td>
<td>2.25 D</td>
<td>3.00 D</td>
<td>3.75 D</td>
<td>4.50 D</td>
<td>5.25 D</td>
<td>6.00 D</td>
</tr>
<tr>
<td>Optic Diameter</td>
<td>6.0 mm</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Overall Length</td>
<td>13.0 mm</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Optic Type</td>
<td>Biconvex Toric Aspheric Optic</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IOL Powers</td>
<td>+6.0 D to 30.0 D</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Haptic Angulation</td>
<td>0 degrees (planar)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Haptic Configuration</td>
<td>STABLEFORCE® modified L haptic lenses</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Suggest A-Constant</td>
<td>119.0°</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Refractive Index</td>
<td>1.55</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Light Filtration</td>
<td>UV and Blue Light</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Provided as guideline only
Precise Astigmatism Correction

• Reduction of residual refractive cylinder.

• Improved uncorrected distance visual acuity.

• Increased spectacle-independent distance vision.

Reduction of Residual Refractive Cylinder

63% of patients achieved ≤0.50 diopters of residual refractive cylinder.
87% of patients achieved ≤1.00 diopters of residual refractive cylinder.††

†† AcrySof® Single-Piece IOL (SA60AT)

1. Based on unilateral clinical study results (Models SA60T3, SA60T4, SA60T5). See package insert.
Rotational Stability

less than 4° average rotation 6 months after Implantation¹.

›81.1% of patients were ≤5° of intended axis¹.
›97.1% of patients were ≤10° of intended axis¹.

¹ Based on unilateral clinical study results (Models SA60T, SA60T, SA60TS). See package insert.

Rotational Stability, continue

Three factors

› **STABLE FORCE** lens haptics keep IOL highly stable and centered in capsular bag².

› **Flexible haptic** design provides optimal placement in capsular bag, regardless of size².

› AcrySof® lens materials **binds to fibronectin.**
  » Ensures adhesion to anterior/posterior capsule³

² Above Data On File
AcrySof® IQ ReSTOR® +3 IOL

AcrySof® IQ ReSTOR® IOL
Background

2005
AcrySof® ReSTOR® +4 Add IOL

2007
AcrySof® IQ ReSTOR® Aspheric +4 Add IOL

2008
AcrySof® IQ ReSTOR® Aspheric +3 Add IOL
• Utilizes diffraction to simultaneously create a near and distance focal point independent of pupil size.

 Apodized Diffractive Structure

• 3.6 mm diameter Apodized diffractive region
  • Precise reduction in step heights from 1.3 microns to 0.2 microns
  • Decreasing steps heights direct more light energy to the distance focal point
  • Gradual energy blend between powers

• Width between steps determine the add power

• Step heights control the light distribution
Theoretical Light Energy Allocation


Overall Spectacle Wear

6 MONTHS POSTOP

% of Subjects

<table>
<thead>
<tr>
<th>Condition</th>
<th>% of Subjects</th>
</tr>
</thead>
<tbody>
<tr>
<td>Never</td>
<td>78%</td>
</tr>
<tr>
<td>Sometimes</td>
<td>20%</td>
</tr>
<tr>
<td>Always</td>
<td>2%</td>
</tr>
</tbody>
</table>

N = 138

Source: AcrySof® IQ ReSTOR® IOL clinical data on file (models SN60AD1 and SN64AD3). Fort Worth, TX. Alcon Laboratories, Inc.
Measured Pinhole Images through Modified ISO Model Eye* to Simulate Night-time Car Headlight Halo

(5 mm Pupil, distance focus, simulate car headlight 18 degree off-axis at 360 meter)

- ReSTOR® IOL¹
  - 2 arc min
- Tecnis ZM900
- ReSTOR® Aspheric IOL (3.0 add)
- Crystalens
- ReSTOR® Aspheric IOL (4.0 add)

* 0.2 micron spherical aberration at 6 mm entrance pupil

Source: Data on file. Alcon, Inc. & D2 Technical Report
1. Non-Aspheric +4 ReSTOR®

Patient Quality of Life

OVERALL PATIENT SATISFACTION WITH (WITHOUT GLASSES)

- Completely Satisfied
- Not at all Satisfied

Before Cataract Surgery | After Bilateral Surgery
-------------------------|--------------------------
ReSTOR +3 IOL

Source: AcrySof® IQ ReSTOR® IOL clinical data on file (models SN60AD1 and SN60AD3). Fort Worth, TX: Alcon Laboratories, Inc.
AcrySof® IQ ReSTOR® Toric

AcrySof® IQ ReSTOR® Multifocal Toric IOL

- Single surgical procedure for presbyopia correction and corneal astigmatism management

- When used in conjunction with the online calculator enables the surgeon to greatly reduce residual cylinder, eliminating the need for additional surgical procedures.
Anterior Apodized Diffractive Aspheric Surface

Same design as current AcrySof® IQ ReSTOR® +3.0D Add Multifocal IOL (Model SN6AD1)

- 9 apodized diffractive steps for +3.0D add power and balanced light energy management
- Negative 0.1 micron spherical aberration factor corrects for the positive spherical aberration of the cornea

Posterior Toric Lens Surface

Same design as current AcrySof® Toric IOLs

- Posterior toric axis marks
- Posterior toric surface
- Allows the lens to correct pre-existing corneal astigmatism

AcrySof® IQ ReSTOR® Multifocal Toric IOL (Model SND1TT)

<table>
<thead>
<tr>
<th>Product Characteristic</th>
<th>Model Numbers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Optic Type</td>
<td>SND1T2</td>
</tr>
<tr>
<td>Material</td>
<td>Biconvex Apodized Diffractive Aspheric Toric</td>
</tr>
<tr>
<td>Optic Diameter (mm)</td>
<td>6.0</td>
</tr>
<tr>
<td>Overall Length (mm)</td>
<td>13.0</td>
</tr>
<tr>
<td>Haptic Angle</td>
<td>0°</td>
</tr>
<tr>
<td>IOL Powers (spherical equivalent diopters)</td>
<td>Current availability is 16.0 to 25.0 Diopters (0.5D increments)</td>
</tr>
<tr>
<td>IOL Cylinder Powers (IOL Plane)</td>
<td>1.00 D</td>
</tr>
<tr>
<td>IOL Cylinder Powers (Corneal Plane)†</td>
<td>0.68 D</td>
</tr>
<tr>
<td>Add Power</td>
<td>+3.0 D</td>
</tr>
<tr>
<td>Add Power at Spectacle Plane</td>
<td>+2.5 D</td>
</tr>
<tr>
<td>Suggested A-Constant</td>
<td>118.9</td>
</tr>
</tbody>
</table>

†Based on average pseudophakic human eye
AcrySof® IQ ReSTOR® Multifocal Toric IOL
Online Calculator Summary

Calculator Output Screen Summary:
• Appropriate SND1TT IOL model
  – Check calculated models with effective Dpt and
    Cyl range availability
• Spherical equivalent lens power
• Optimal axis location of the IOL
• Anticipated Residual Astigmatism
Theoretical Total Energy Balance

Key Considerations For Optimal Outcomes

• Marking the eye:
  – Prior to surgery mark the operative eye with at least two reference points (e.g. three o’clock and nine o’clock positions) while the patient is sitting upright to prevent cyclotorsion.

• Temporal incisions are recommended.

• Target the lowest possible residual astigmatism. Patients with significant postoperative astigmatism >1.0D may not achieve optimal visual outcomes.

Review Article

Toric and Multifocal toric IOLs
*Journal of cataract and refractive surgery*
*April 2013*
Graphic: Hassan El-Sheshb - 0222 34 48 49 & Alex