



Wave Front Topography



ReSeeVit Evolution Topography Module for
Modi Topographer



Introduction

- “The aberrations in the central optical zone have a greater effect than those closer to the edge. From an optical point of view, the ideal cornea must have an optical zone consisting of an elliptical surface, with an adequate shape factor (Asphericity), it must be perfectly smooth and have the apex centered on the visual axis. There will be spherical aberration if the shape factor is not adequate; if the apex is not centered, there will be a prismatic effect, astigmatism from oblique incidence and coma; if the surface is irregular, there will be high order aberrations.” - Antonio Calossi, O.D.
- The above considerations can all be reviewed and assessed with a corneal topographer.
- The Modi and topographer take a reading 4mm from the cornea and are accurate within one micron. Newest software also provides a standard deviation value that can be used to express the repeatability of the instrument.

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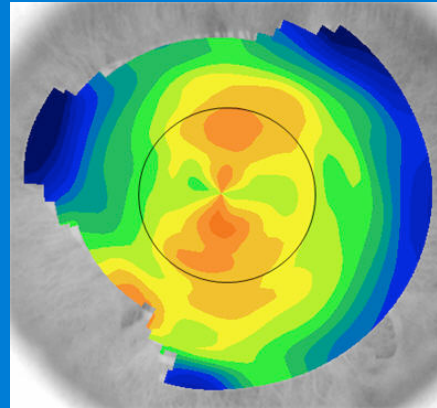
Keratometrics

- **Sim K:** this is a simulated keratometry reading, which is calculated by determining the average power along each meridian in the central 3mm zone. This uses the steepest and flattest values which are perpendicular to each other. The cylinder is the difference between these major and minor axes. These values represent the 6,7,8,9 Placido rings.
- **Meridians:** These are more accurate values using the 3 zones, 3, 5, and 7. This also takes into consideration the steepest and flattest value of each zone.

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Indices

- Keratoconous Screening
- Curvature Gradient
- Corneal Asphericity
- Keratorefractive Indices
- Optical Zone Decentration



Keratoconous Screening

This feature uses 3 different clinical refractive indices to evaluate the cornea for possible irregularities. Some of these indices compare data from the topography and a population of 1,000 patients in order to determine if the cornea is normal. If the indice is within 2 standard deviations from normal, it will be shown in **green**. If the indice is shown in **yellow**, it 3 standard deviations from normal. If it is shown in **red**, it is 4 or more standard deviations from normal. If it is in black, it is not compared to the population.

- Apical Keratometry - The power of the steepest point on the cornea expressed in Diopters
- Apical Curvature Gradient - Analyses of the difference between the center and the periphery expressed in D/mm
- Symmetry Indices - The cornea is separated into two hemispheres. The difference between a point from the top hemisphere and a point from the bottom hemisphere is calculated.
- Keratoconous Probability - Takes into consideration all of the above indices to determine the probability of the cornea having keratoconous

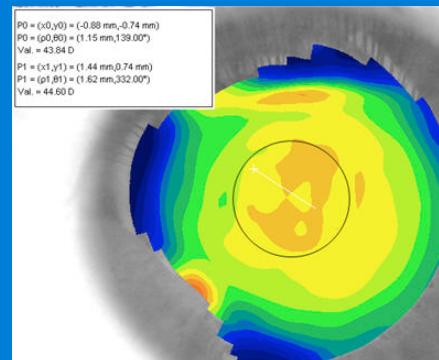
Keratoconous Shape Indices

If the cornea is determined to be suspect for keratoconous, the software will provide additional shape indices

- Keratoconous Area - outline the area of the cone express in millimeters **Exclusive to ReSeeVit!**
- Keratoconous Average Diameter - Gives the diameter of the cone measured in millimeters
- Center Point of Keratoconous
- Roundness

Curvature Gradient

- Advanced Indices that allow the user to choose two points on the cornea and calculate the difference between them



Corneal Asphericity

- Corneal Asphericity - the roundness of the cornea compared to a sphere. There are 4 ways to express asphericity: e , P , SF , Q , which represents an 8 mm zone



Circle
 $e = 0$



Ellipse
 $e > 0$



Parabola
 $e = 1$

Keratorefractive Indices

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- Astigmatism
- Mean Pupillary Power
- Asphericity
- Spherical Aberration
- Irregularity of Curvature
- Surface Asymmetry



Astigmatism

Astigmatism - verifies a difference in power between two optical surfaces of the eye. It is taken from meridians (3mm zone and 5 mm zone).

For two diameters, these values represent the degree and the axis of the regular astigmatic component of the cornea.

Can be corrected with spectacle lenses

A difference in the axis or power between the two diameters indicates the presence of irregular astigmatism.

Cannot be efficaciously corrected with any spectacle lens



Mean Pupillary Power

- **Mean Pupillary Power** - is the mean axial curvature, expressed in Diopters, for an entire portion of the cornea with a diameter of 3 mm centered on the entrance pupil. It represents the spherical equivalent of the cornea within a pupillary zone with a diameter of 3 mm.

Useful to recognize if the cornea has aberrations!

Asphericity and Spherical Abberation

These indices give the mean asphericity of an area of the cornea 4.5 mm in diameter, centered on the pupil. The coefficient that describes the degree to which the cornea is prolate or oblate. This would be described as a circle, ellipse, or a parabola

Spherical Asphericity - describes the shape of the cornea

Spherical Abberation - describes the optical consequences of that shape

These provide an easy way to understand the optical zone of the cornea

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Irregularity of Curvature

Irregularity of Curvature - takes the mean value of many points to describe whether the cornea is or is not regular compared to a best fit aspherical surface. This is calculated from an area of 4.5 mm, centered on the pupil and expressed in Diopters.

Indicates High Order Abberations

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Surface Asymmetry

Surface Asymmetry - is an index of an area of cornea with a diameter of 4.5 mm and gives the difference between two hemispheres of the eye. It uses the steepest and flattest points from each hemisphere.

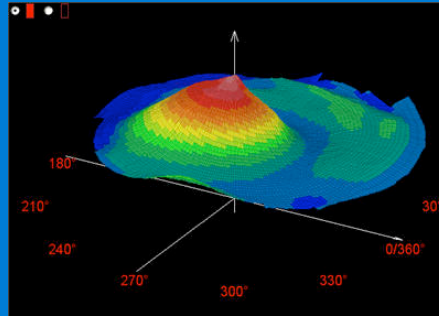
A cornea with a perfectly symmetrical optical zone has a value of zero

This indicates Coma!



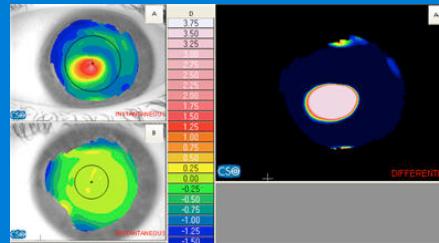
3 Dimensional Map

- View the map with a 3 dimensional view in order to see all aspects of the eye



Advanced Map Views

- ReSeeVit allows you to view more than one map at a time.
 - Comparison – view 2 maps side by side
 - Differential – view net changes between 2 or 3 maps



Topography Procedure

- Take more than one image
- Once you have chosen the topography and made adjustments to the rings, map the image. Chose within the color map the Axial function and change the scale to Absolute. This will tell you if the cornea is regular. There will not be more than 2 colors on the central zone of a normal cornea. The step of the absolute scale is in 1.5 D, and if there is more than 2 colors in the central zone, this indicates that the cornea has a change of more than 2 D.
- Change the map to Instantaneous and adjust the scale to Normalized. This will give the characteristics of the cornea and will indicate that this is a normal astigmatism.
- Pull up the Keratorefractive Indices. These indices will provide a quick reference as to the normalcy of the cornea.
- If the cornea is normal at this point the exam is complete or one may move to contact lens fitting.
- If this is not a normal cornea, use the Zernike Wave Front Analysis



Contact Lens Software

- The software will allow you to choose from different manufacturer's and different lens models.
- The software will perform a best-fit for the cornea.
 - Manufacturer- will show the top 10 best-fit lenses from one particular manufacturer
 - Archive - will show the top 10 best-fit lenses for different manufacturer's
- This feature provides the customer with an unlimited amount of trial contact lenses.

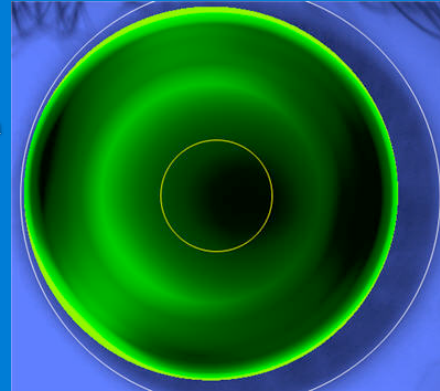


Contact Lens Features

- The software will choose the best radius for the tear film space. Optimum space is the 10 microns of tear film.
- The system remembers the last manufacturer used, and will display the best-fit lens using that manufacturer the next time one chooses the contact lens software.
- Favorites can be recorded within the system with customized parameters.
- Lenses can be moved by clicking on the lens and sliding from one side to the other for correct fit.
- Refraction button will allow you to choose the power of the lens. When the base curve is changed on the lens, it will change the power of the lens. The system will then allow for an over-refraction to be done to adjust for this.

Custom Designing Procedures

- Choose Generic Manufacturer
- Start with any model type
- Next choose Customize
- Pick a lens type
- Input the parameters
- Examine the Simulated Flourescein Pattern



Pupillography Features


- The built in pupillographer has the ability to measure the pupil diameter in four lighting conditions.

Due to the design of the topographer, the dynamic pupil change can be measure binocularly.

- Dynamic - reads the changing situation of a pupil from scotopic to photopic.
- Photopic - is the normal condition of light, means the light in the room is fixed in condition of lux from 40 - 400 lux. 400 lux being high photopic.
- Mesopic - Conditions are not more than 4 lux.
- Scotopic - Conditions are not more than 0.04 lux.

Pupillography Benefits

- The pupillographer has the ability to measure a range of pupil size in different lighting situations. This is important as pupil size is a necessary parameter when examining a topography of the eye.
- The following are a sample of the many applications for pupillography:
 - Routine examination of the eye
 - Neurology
 - Orthokeratology
 - Refractive Surgery Referrals
 - Refractive Surgery
 - Refractive Surgery Postoperative Examinations



ReSeeVit Evolution - The Total Solution

- ReSeeVit Evolution integrates the following modules into a single common database:
 - Anterior Slit Lamp Imaging
 - Posterior Retinal Imaging
 - Pupillography
 - Topography
 - Tomography
 - Specular Microscopy
- *** Modules are purchased separately

