MARRIAGE MADE IN HEAVEN?

Topography and GP Design

Michael Wyss
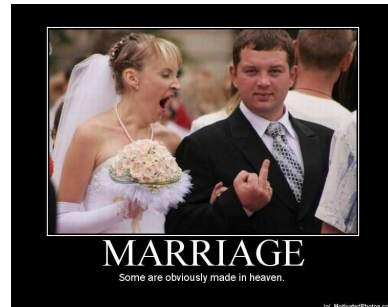M.Sc. Optometrist FAAO
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http://www.kontaktlinsenstudio.ch/medien/medien_Frameset.htm

freedom to see

Marriage made in Heaven?

freedom to see

Technique

- Placido Rings monitored with a video camera
    - Projection of concentric rings to the cornea
    - Distorsion of rings will be mathematically evaluated
    - Reflexion on the cornea are the basis for calculation
    - No measurements in the very center of the cornea, due to the position of the video camera (interpolated data)

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Technique Medmont

- 9,600 measurement points and 102,000 analyze points
    - Coverage extends from a minimum ring diameter of 0.25mm to beyond 10mm
    - Accuracy < 0.1 Diopters

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Technique Oculus

- 22'000 measuring points
    - Nose and forehead make shadows and reduce the amount of measure points
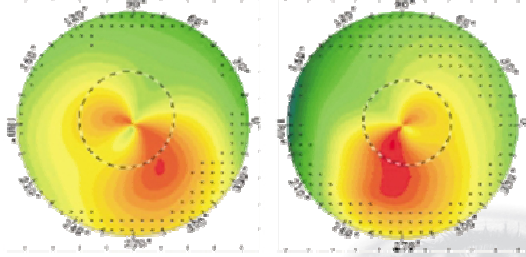   - Only about the central 8mm diameter are really measured
    - Accuracy +/-0.1D

freedom to

Diagnostic Software (Maping)

- The software provides in general 3 different corneal maping possibilities (axial / tangential / elevation)

- Depending on the goal, each mapping offers very specific advantages
    - The next slides shows always the same Px
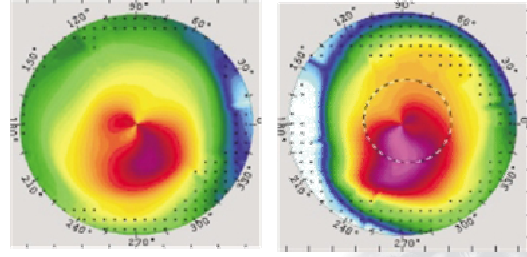
freedom to see

Diagnostic Software (Maping)
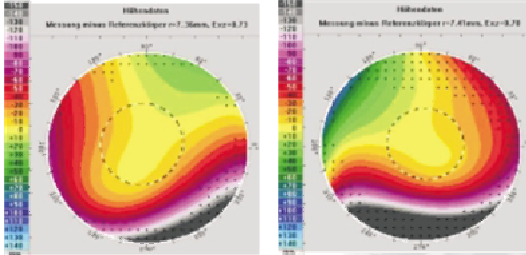
Axial presentation

Diagnostic Software (Maping)

Tangential presentation

Diagnostic Software (Maping)

Elevation Data
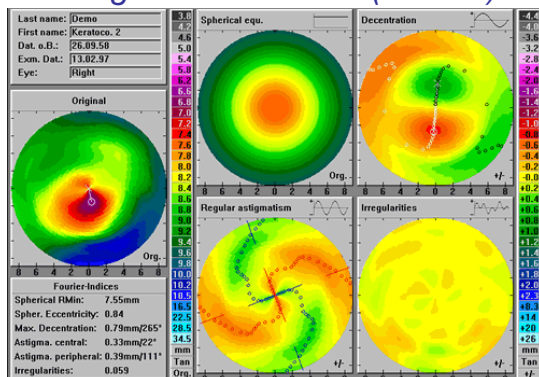

Diagnostic Software (Fourier)

- Fourier Analysis
  - Mathematical separation of the topographic map into individual components
  - Optical aberration (spherical component, decentration or decentration with spherical component, regular astigmatism, irregularities or irregularities with spherical component)

Diagnostic Software (Fourier)

Diagnostic Software (Indices)

- Automatic identification giving cornea indices and topographical classification of cornea (e.g. stage 2 keratoconus, abnormal cornea, etc)
  - New state of the art in communication with ophthalmologists

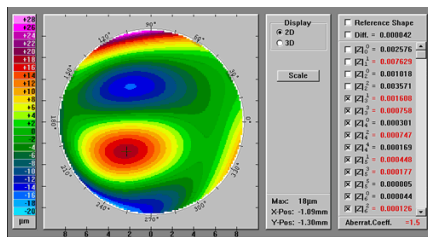## Diagnostic Software (Indices)

Diagnostic Software (Indices)

Please note:

- This assessment by the software is entirely based on topography and is not to be regarded as a basis for a clinical diagnosis!!
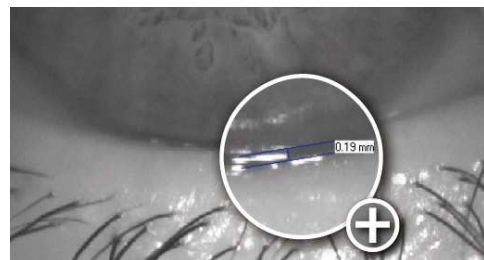
Diagnostic Software (Zernike)

- Higher Order Aberrations can be visualized and analyzed by Software
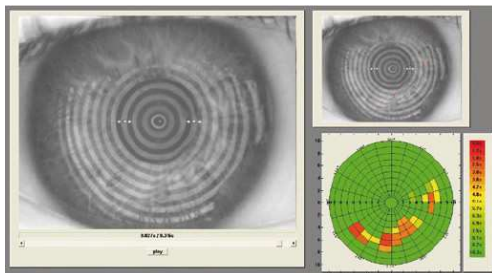 - Aberration Index above 1.50 are suspeces

Diagnostic Software (Dry Eye)

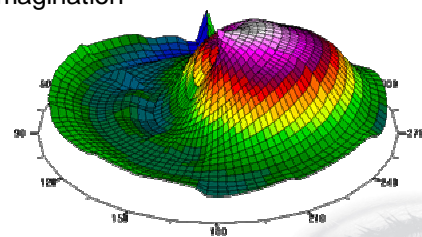- New: Tear Meniscus Tool (TF Scan)

Diagnostic Software (Dry Eye)

- New: BUT (Break Up Time)

3D Images

- Gives you and your patient an imagination
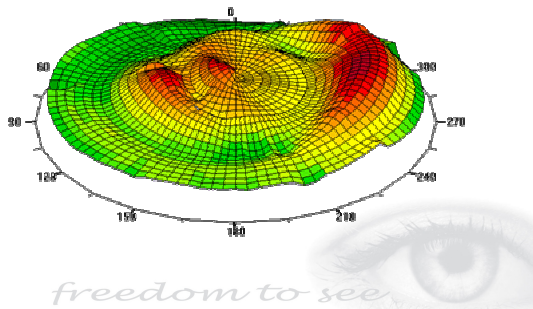

3

3D Images

Regular Astigmatism
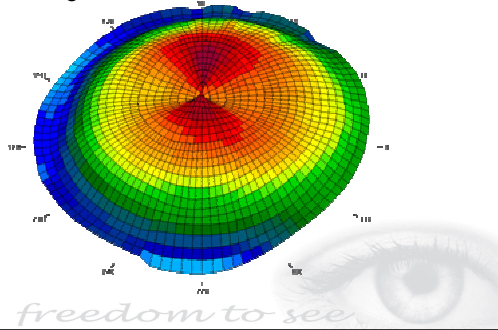
3D Images

Irregular Astigmatism
post Trauma
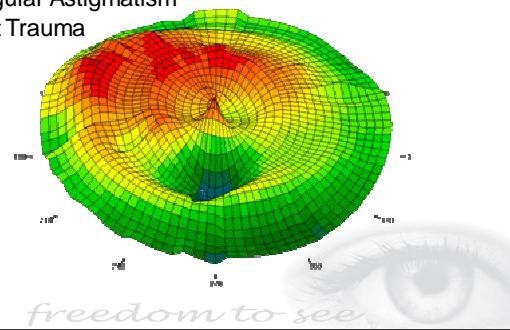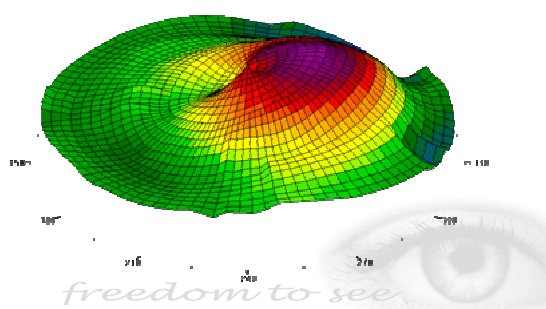
3D Images

Pseudo Keratoconus (high riding contact lens)
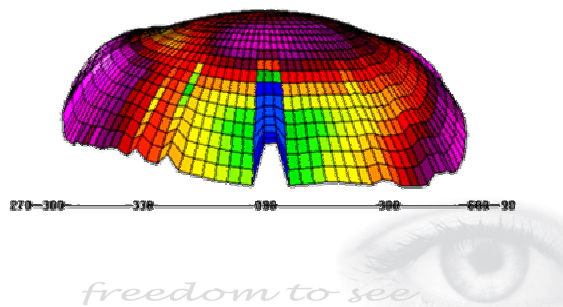
3D Images

Keratoconus

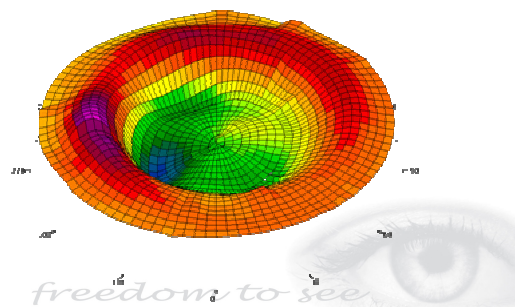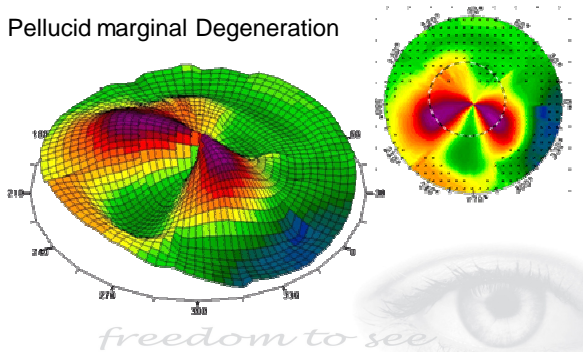## 3D Images

Keratoplasty

3D Images

LASIK / Orthokerathology

3D Images

Pellucid marginal Degeneration

freedom to see.

Fitting Software

- The software automatically suggests a CL from the integrated database and calculates a fluorescein pattern
  - Geometry and overall diameter can be manipulated individually on computer, without having every single lens tested on the eye
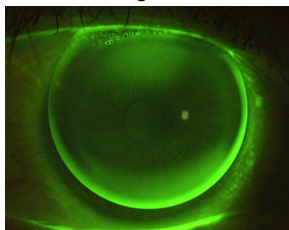 - Data need to be confirmed by having one defined contact lens interpreted on the eye

freedom to see.

Fitting Software

freedom to see.

Fitting Software

freedom to see.
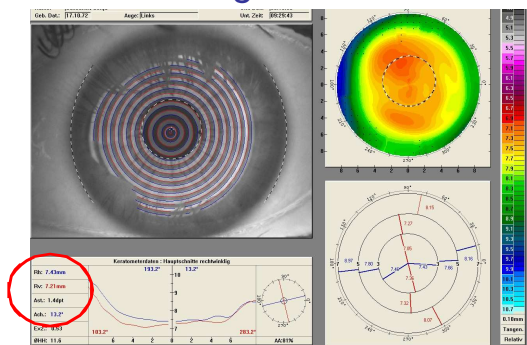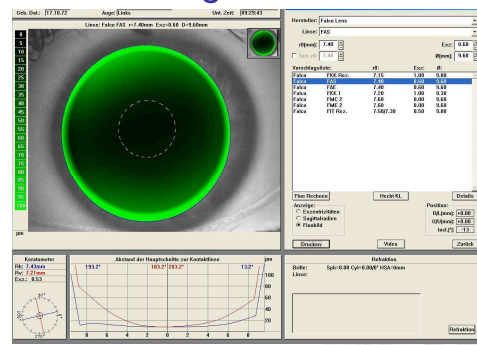
Fitting Software

- "Real Life" peripheral Astigmatism
  - The lens rocks around flat meridian
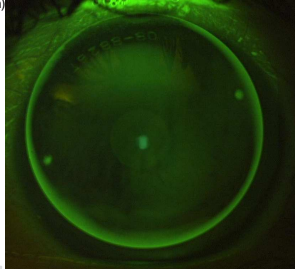 - High or Low Riding lens as a consequence

freedom to see.

Fitting Software

Final Parameter: 7.35 -3.0 9.80 06/00

freedom to see.

Fitting Software

- Peripheral Toric lens Design
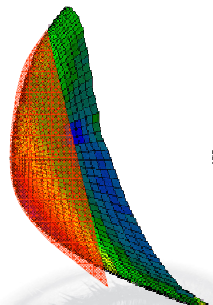 - Optical Zone has a spheric Design (without inducing vertical astigmatism)

Specialties

Keratoconus

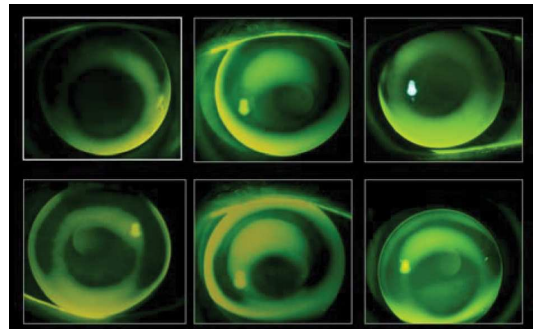- Rotation symmetric Design on a asymmetric Cornea

Keratoconus

Picture curtesy of Pat Caroline

Keratoconus (Scarring)

- CLEK Study 1994 - 2002 (1'209 PX)
  - 32% of flat fitted Px by eight years vs. 14% steep fitted

- Korb et al, 1982 (7 Px)
  - 57% flat vs. 0% steep after 12 month

- Maguen et al, 1983
  - 25% flat by 3 years had "significant staining"

Keratoconus

- Quadrant-specific Design
  - The idea is to fit the lens in every quadrant as good as possible to the origin cornea curvature
  - The lens has inferior a black colored engraved point which must be inserted in 270°
  - The lens then will be click-in the cornea curvature

Keratoconus

Keratoconus

Keratoconus

Keratoconus

Keratoconus

Penetrating Keratoplasty

Penetrating Keratoplasty

- Example of a common problem
  - fitting a rotation symmetric small lens

Penetrating Keratoplasty

- Second try:
  - Bigger Diameter, with reverse geometry
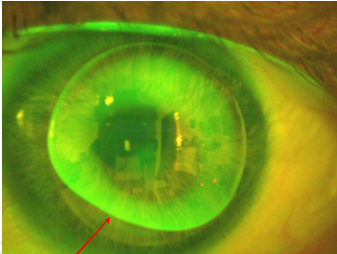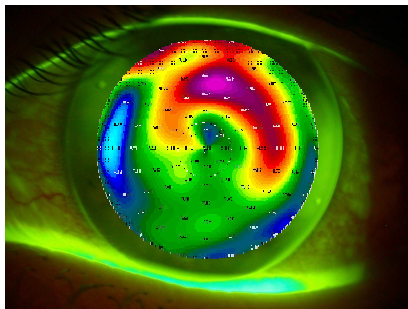 - Spherical optic, Periphery-toric alignment

- Periphery-toric Design
  - Horizontal Eccentricity 1.0
  - Vertical Eccentricity 0.6

- Astigmatism of 2.4 dpt in the Periphery

Penetrating Keratoplasty

Penetrating Keratoplasty
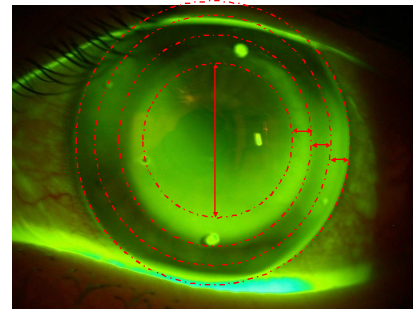
Penetrating Keratoplasty

- New Geometry possabilty for tilted grafts
  - Periphery-toric geometry with tilted reverse geometry

Penetrating Keratoplasty

Penetrating Keratoplasty

Orthokeratology

Orthokeratology

- NaFl becomes visible at a thickness of 20µm (Young 1989)
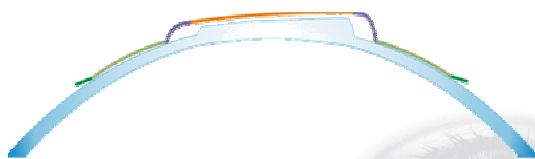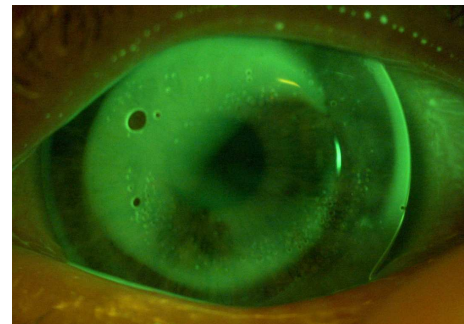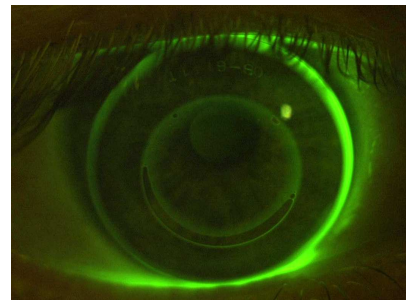 - Only way to see, what the lens has done during night in her static state under the closed eye

- Diagnostic of the cause of a problem
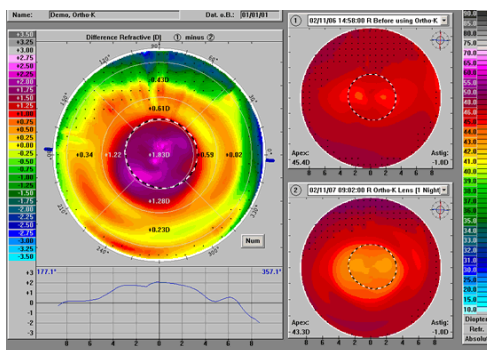 - Difference map shows what actually happens to the origin cornea

Orthokeratology

- Use axial, tangential an refractive power difference (subtractive) maps
  - Axial Power shows the objective Rx changes
  - Tangential Power shows centration of the changes
 - Refractive Power shows objective Rx and Treatment-Zone changes

Orthokeratology

Orthokeratology

- Bulls-Eye is the ONLY valid and acceptable outcome
  - Good high contract sensitivity
  - Maximum Rx change with time
- Characteristic:
  - A well-centered area of corneal flattening (Treatment Zone)
  - A circle of mid-peripheral corneal steepening
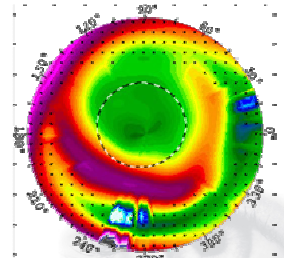 - Little or no peripheral corneal change

Orthokeratology

- Bulls Eye
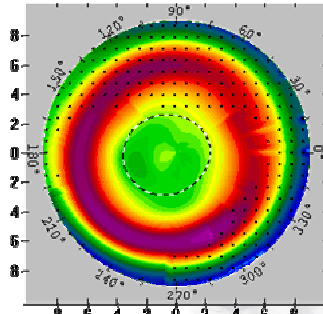
Orthokeratology
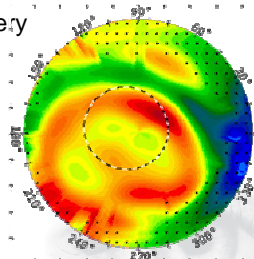
- "Smiley Face" : Highriding Lens during sleeping
  - Too flat in periphery
  - Sagittal depth too low

Orthokeratology

- "Frowny Face": Low riding lens during sleeping
  - Too steep fitted Periphery
 - Sagittal depth too high

Orthokeratology

- "Central Island"
  - Developing after 1 week or more, a true central island never resolve over time
  - Early sign: Around Bulls-Eye formation, slight indentation
- Characteristic
  - Steep zone always around the pupil
  - Too steep, right after Reverse Zone
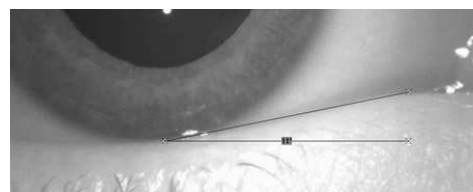 - Too hard alignment pressure

Orthokeratology

- Warning!!
  - Staining in the very center can mimic a central island
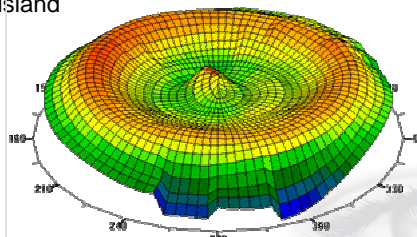
Presbyopia

- Lid-Angle Measurement
  - Usefull in translating GP designs to determin possible rotation of reading segment

Presbyopia

- Near-portion height measurement
 - Essential to determine the dividing line for translating bifocal contact lenses

Presbyopia

- Pupillometry
  - Graphical representation of the results: change of pupil within a span of time; minimum, medium and maximum pupil diameter including standard deviation
  - Essential for simultaneous multifocal contact lens designs

  - Possibility of comparison view for Anisokoria

Presbyopia

- Pupillometry
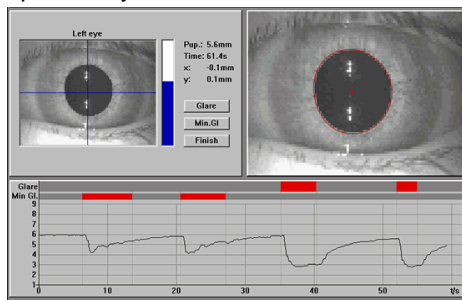
GP

A GROWING PLEASURE!

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http://www.kontaktlinsenstudio.ch/medien/medien_Frameset.htm