New Lasers and techniques in CXL

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AJK is a consultant for Alcon, Wavelight and Avedro.
Our team’s CXL innovations:

• Higher fluence: **2006**
• Intrastromal treatments through femto-pockets: **2007**
• Combining high fluence CXL with topo-guided reshaping of irregular corneas: **2005**
• LASIK Xtra: **2008** (ESCRS)
• LASIK Xtra for hyperopia: **2011** (ASCRS)
• Creating CXL differentials within the cornea: today!!
Is CXL a refractive procedure?

This is a simple 3mW CXL-alone case from 2005

Now 2013 has Flattened 12D!!!
• The creation of CXL differentials within the cornea can have a refractive effect
• First presented in the 2012 CXL meeting in Geneva
• Published: JRS 2013: Kanellopoulos AJ
Prophylactic higher fluence CXL in LASIK
a novel technique

CXL meeting
Dresden 08

• Henry Perry, MD and A. John Kanellopoulos, MD
• Clinical Associate Professor New York University Medical School
• Director, Laservision.gr Institute, Athens, Greece
HYPEROPIC LASIK

A drop of 0.1% riboflavin sodium phosphate solution, just prior to its spread over the exposed stromal bed
Compelling CXL evidence in the contralateral eye Hyperopic LASIK Xtra group

Kanellopoulos and Cahn JRS Nov 2012
Nonlinear Optical (NLO) Macroscopic Assessment of 3-D Corneal Collagen Organization and Axial Biomechanics

This is how the collagen fibers in an ectatic KCN cornea are imaged. Courtesy of Dr. Minkler, Un California, Irvine.
NLO scanning for collagen autofluorescence
upper density is surface CXL, lower is in-pocket CXL (400um)

Courtesy of
Dr. Minkler,
Un. California,
Irvine.
The Athens Protocol 4 steps:
same day PTK > topoPRK > MMC > CXL (10mW/cm² x 10 min)

1- PTK

2- topo-guided PRK

3- 30” MMC

4-: CXL
Oculink Vs Topolink in Athens Protocol

Oculink (Pentacam driven) appeared more effective!

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Athens Protocol: improved anterior corneal profile, but what about the posterior?

Group B, AP-treated KCN eyes Corneal Astigmatism

- **Anterior Astigmatism (D)**
  - Mean: -1.457
  - StDev: 3.881
  - N: 212

- **Posterior Astigmatism (D)**
  - Mean: 0.4830
  - StDev: 1.321
  - N: 212

**New York University School of Medicine**

Kanellopoulos, MD

**LaserVision.gr**
Novel Avedro KXL-II Device
Riboflavin penetration captured by Build—in Scheimpflug image
Methods

We treated 30 consecutive cases of partially sighted eyes with 5 different treatment patterns:

• Transepithelial myopic pattern+plus O₂
• Myopic pattern following PTK (5mm OZ, 50 um)
• Transepithelial toric pattern+O₂
• Transepithelial customised topography-guided pattern+O₂
• Presby-Hyperopic pattern, after donut-like PTK (50micron 6-9mm oz)
Toric profile-transepi:

4min **Paracel** + 6min **VibexXtra**

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<th>Time (min, sec)</th>
<th>Total Energy (mJ)</th>
<th>X Position (mm)</th>
<th>Y Position (mm)</th>
<th>Axis (deg)</th>
<th>Dim. 1 (mm)</th>
<th>Dim. 2 (mm)</th>
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Treatment Power: 45 mW/cm² - Pulse On: 1.0 s, Pulse Off: 1.0 s.
1 month Validation with Placido images
Toric PiXL!
4 month topography-customised tran-epithelial CXL treatment

Avedro’s KXL II