

An ASCRS Course on

Advanced Corneal Topography for Premium Lens Surgery & for Refractive Surgery

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TITLE: Advanced corneal topography in keratorefractive surgery and in premium IOL implantation

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Course Description:

This unique advanced corneal topography course will review all clinically important aspects of corneal topography used in keratorefractive surgery and in cataract surgery with premium IOLs. Topics include principles and the latest advances in corneal topography and description of various types of topographic systems. Clinical applications will be focused on corneal topographic analysis to achieve optimal outcome in keratorefractive surgery and in lens-based surgery such as with presbyopia-correcting IOLs.

Keywords: corneal topography, refractive surgery, cataract surgery, premium IOL, presbyopia-correcting IOLs.

- A. Basics of corneal topography
Placido disc; Scanning slit; Scheimpflug; Ultrasound; Topo-wavefront combined
- B. Basics of keratometry
 - 1 Manual
 - 2 Topographic sim-K
 - a) Derived from placido disk
 - b) Derived from scheimpflug
 - 3 Automated (IOL master)
- C. Posterior corneal topographic changes after keratorefractive surgery
- D. Three-point touch: improving form frusta keratoconus detection

- E. An approach to recognize pseudo FFKC
- F. FFKC topographic criteria 2011
- G. The role played by corneal topography in IOL calculations
 - 1 Concept of Effective Lens Position(ELP)
 - 2 Two variable formulas: SRK/T /Holladay 1/HofferQ
 - a) Assumption made between Ks and ELP
 - b) Effect of assumptions on post-refractive IOL calculations
 - 3 Three variable formula: Haigis
 - a) Directly measures Anterior Chamber Depth (ACD), uses three a-constants
 - b) Haigis-L adjustments for improved post-refractive results
 - 4 Multiple variable formula: Holladay 2
 - a) Uses double-K for calculations
 - b) 12 variables
 - 5. Accurate determination of corneal power
 - Manual keratometer; Gullstrand ratio; IOL Master; Placido disc; Atlas numerical view;
 - Orbscan; Pentacam; Pentacam EKR
 - 6. Effect of refractive surgery on ELP
 - 7. Double-K method
 - 8. Haigis-L
- G. Clinical Case Presentations of the role played by corneal topography in premium lens cataract surgery and in keratorefractive surgery
 - Post Myopic LASIK; Post-Hyperopic LASIK; Post-RK; FFKC; Decentered LASIK;
 - Dry eye; Asphericity

References:

Corneal Topography in the Wavefront Era Wang ed (SLACK)
Irregular Astigmatism – Diagnosis & Treatment Wang ed (SLACK)
Corneal dystrophy and degeneration – a molecular genetic approach Wang ed (AAO)
Keratoconus and keratoectasia – prevention, diagnosis and treatment Wang ed (SLACK)
Corneal Topography in the Wavefront Era (2nd edition) (SLACK) Wang, Swartz ed (SLACK)
Atlas and Clinical Reference Guide of Corneal Topography – Wang & Kugler ed (SLACK)
Refractive Lens Exchange – a Surgical Treatment for Presbyopia – Wang ed (SLACK)

FFKC criteria 2016

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2 D rule:

- > 2D difference in superior and inferior k readings outside the central 3mm;
- > 2D difference in the corresponding inferior corneal locations between two eyes;
Absolute value of K very high (over 50D) in one eye;

3-point touch:

Coinciding of location of pathology of ant & post elevation, pachymetry & ant curvature; Displaced apex in all maps.

Anterior & posterior elevation:

- Orbscan (BFS):
“Ominous purple” in the posterior surface;
Anterior greater than 15-20 um;
Posterior greater than 20-25um (post-LASIK: 40-50um);
- Pentacam: (relative to BFS in an 8mm zone):
Anterior elevation differences greater than +8um
Posterior elevation differences greater than +16um
Holladay Report (Pentacam, toric ellipsoid):
Anterior or posterior elevation greater than 10um

Pachymetry:

Bed 250-300um;
Normal: 535um, SD=35um. No LASIK below 1D(500um), no PRK below 2d (465um);
KC: 430um, SD=70um;
Thinnest area is more than 15um thinner than center;
The difference between thinnest areas between 2 eyes is greater than 15-20um;
Abrupt & more rapid “out-of-zone” pachy increase from thinnest point radially out;
Holladay Report (Pentacam): relative pachymetry that exceeds -5% (with respect to NL)

IA orientation, amount, pattern:

> 3D or more dioptic curvature change, in central 3-mm circle;
In central 3-mm circle, not regular (bow-tie) pattern; across the pupil 180 degrees, change of astigmatism orientation and amount;
Against-the-rule astig plus inferior steepening, the "C" pattern, suggesting PMD;

Topo-based FFKC detectors:

Tomey: positive KC score with either the KCI or KCS index;
EyeSys: I-S > 1.3;
Pentacam: ISV, IVA, KI, CKI, /Rmi, IHA, IHD and ABR
Humphrey Atlas: Path-finder, in red zone.