

Irregular Astigmatism – consequences...

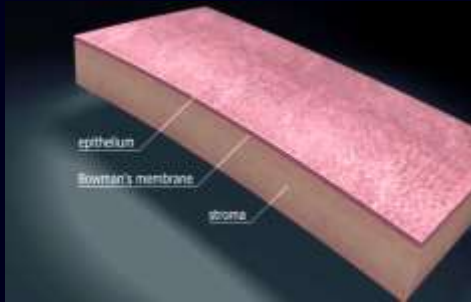
- Poor vision
- Biometry
 - Challenging
 - Errors
 - IOL miscalculation
- Patient (& Surgeon) disappointment



Managing Irregular Astigmatism

- Causes of Irregular Astigmatism
- Identification - Diagnostics
- Principles of Management
- Case examples

Irregular Astigmatism - CAUSES



Irregularity

Tear Film

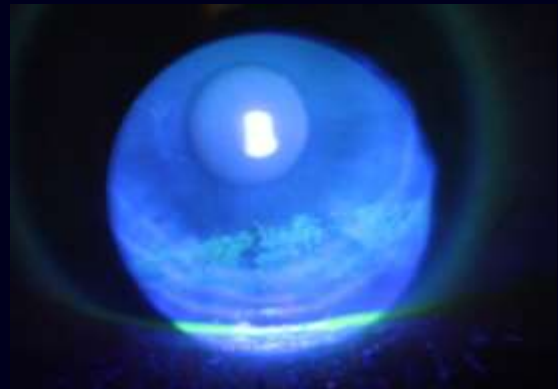
Epithelium

Sub-epithelial

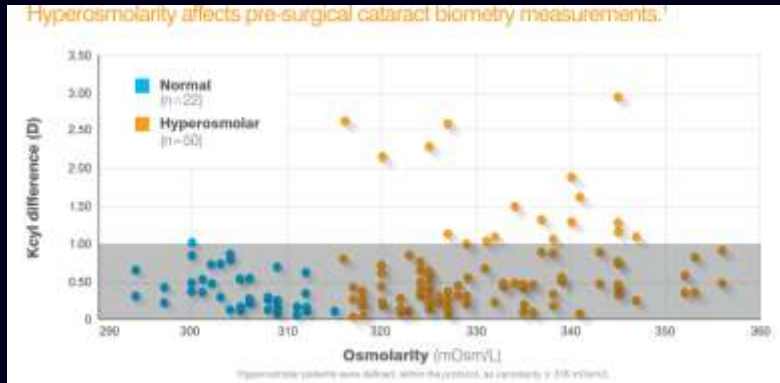
Stromal

Tear Film

- Dry eye
 - Underproductive
 - Evaporative
 - Inflammation
- Irregular tear film



Impact of Tear Film on Biometry



17% > 1.0D difference in Keratometric cylinder between 2 visits
10% > 0.50D in calculated IOL power

Epitropoulos AT, Matossian C, Berdy GJ, Malhotra RP, Potvin R. Effect of tear osmolality on repeatability of keratometry for cataract surgery planning. J Cataract Refract Surg. 2015 Aug;41(8):1672-7. doi: 10.1016/j.jcrs.2015.01.016. PubMed PMID: 26432124

Irregular Astigmatism - EPITHELIAL

- Anterior Basement Membrane Dystrophy



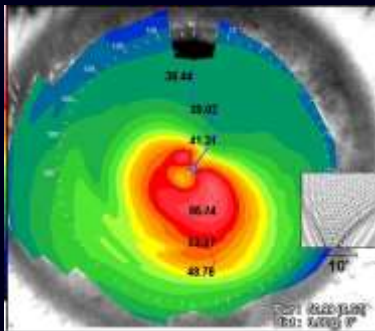
Irregular Astigmatism: SUB-EPITHELIAL

- Salzmann's nodular degeneration
- Scarring Bowman's
- Reiss-Bücklers



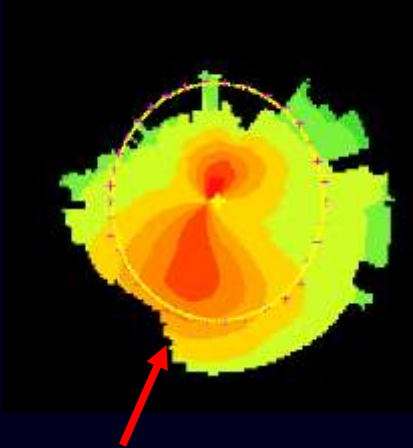
Irregular Astigmatism: STROMAL

- Change in Corneal Shape
 - Ectatic Disorders
 - Stromal Scarring

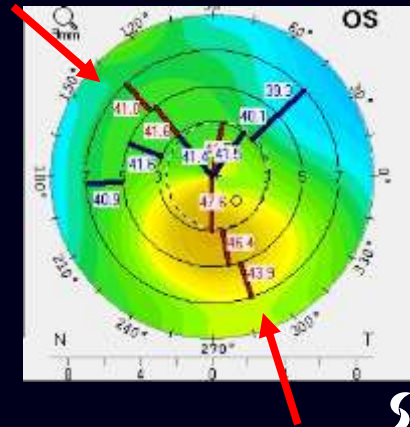


Irregular Astigmatism – Corneal Shape

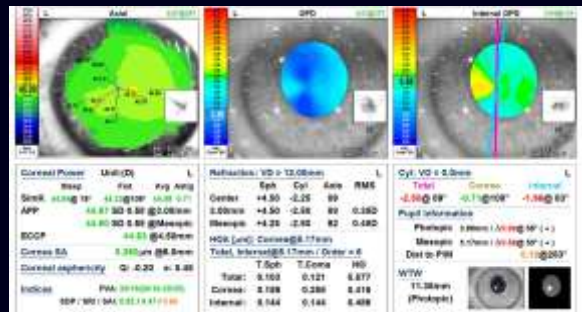
- Asymmetric astigmatism



- Non-Orthogonal

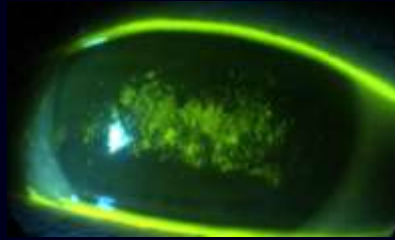


Diagnosis of Irregular Astigmatism



CLINICAL EVALUATION

- Cornea
 - Shape
 - Clarity
 - Surface
- Fluorescein stain
 - Lid wiper action
 - Distribution



DIAGNOSTICS

TOPOGRAPHY

- Reflective
 - Placido based



DIAGNOSTICS

- Placido systems
- Placido combined with Aberrometry
 - OPD 3 (*Nidek*)
 - iTrace (*Tracey Technologies*)
 - KR1W (*Topcon*)

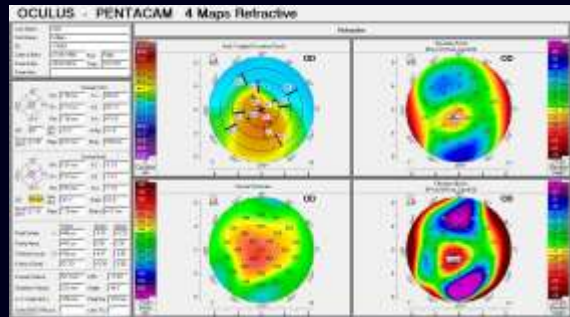


3-Dimensional Diagnostics

Shape analysis and influences

- elevation
- posterior cornea
- thickness

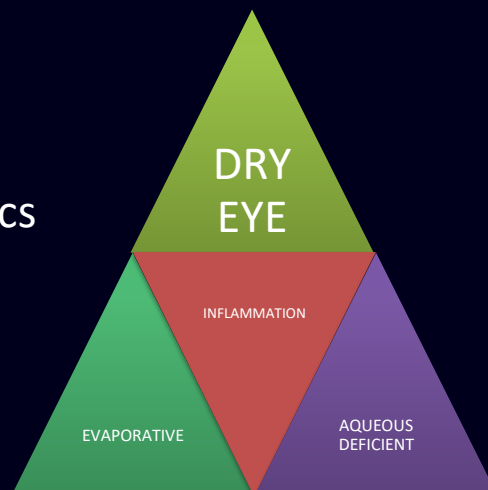
- Scanning slit (Orbiscan)
- Scheimpflug (Pentacam, Galilei)



“Dry Eye”

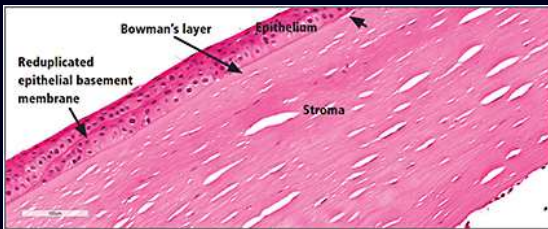
Evaluate cause & treat

Once stable – repeat IOL calcs



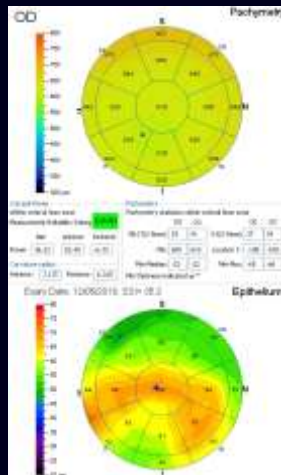
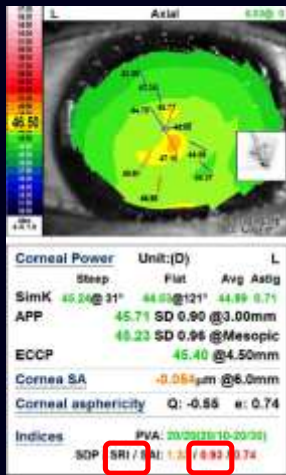
Anterior Basement "Dystrophy)

- Pathology: Duplication of Basement membrane
- Commonly in association with Meibomian Gland Disease
 - ? Related to inflammation
- Irregularity best removed
 - Epithelial debridement
 - Phototherapeutic keratectomy (PTK)



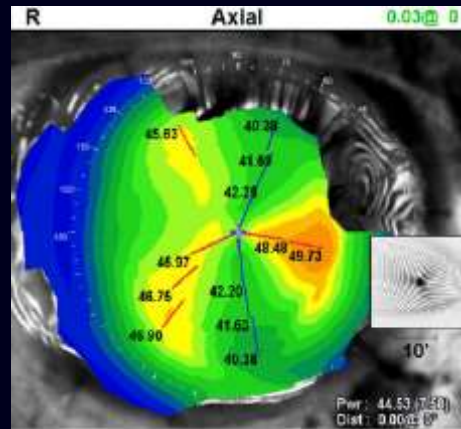
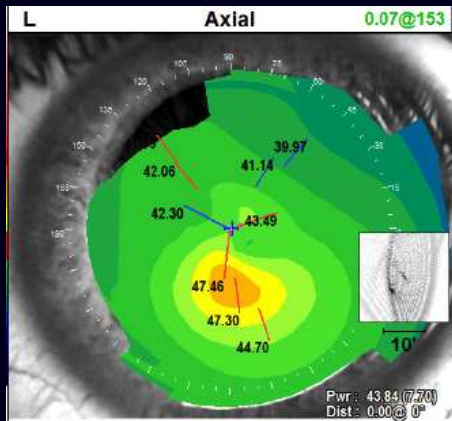
ABMD

- IOL calculations 6 weeks later



Non-orthogonal Astigmatism

Keratoconus – commonest cause



CENTRE
FOR
SIGHT

Non-orthogonal Astigmatism

- What was the Best SPECTACLE corrected vision before cataract ?
 - If good (6/12 or better) – consider a TORIC IOL
 - If not good, consider changing corneal shape

Change corneal shape

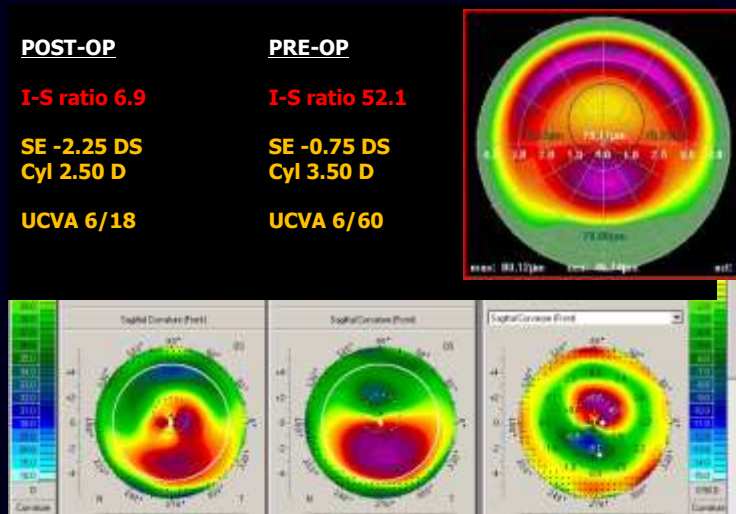
Intracorneal rings

Topolink with CXL

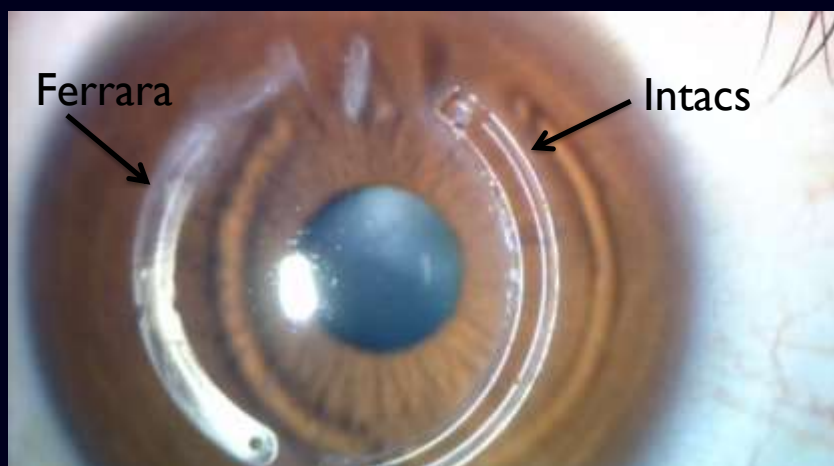
Corneal Transplant

CENTRE
FOR
SIGHT

CXL and Topographic PRK

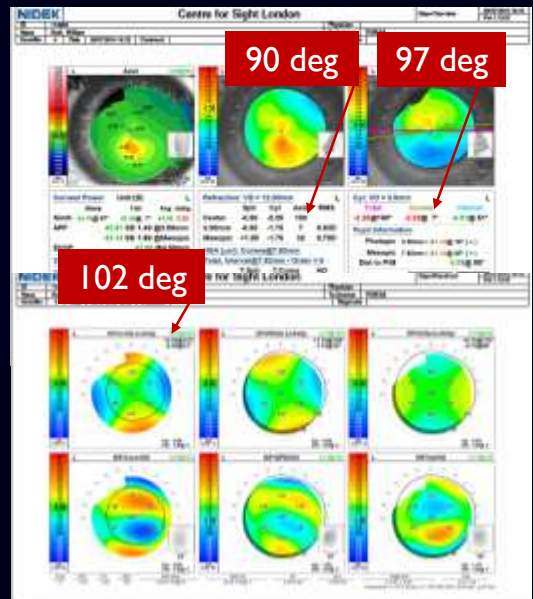
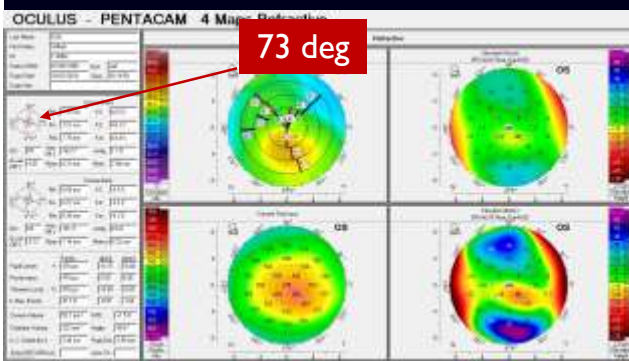


Intracorneal Rings





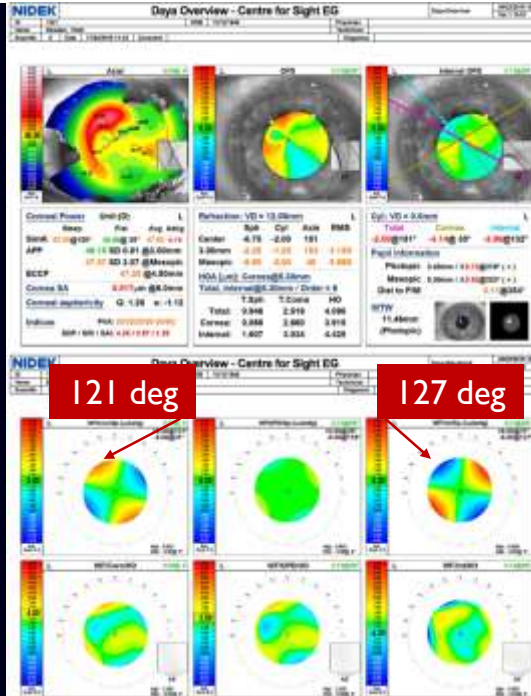
Toric IOL What axis to use for implantation ?



Use Corneal derived aberrometry
 Polynomial for astigmatism
 $(Z_2 \pm 2 \quad S_2 \pm 2)$

Lens orientation

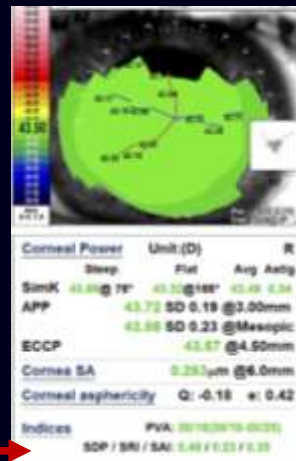
Post Toric lens implant



Managing Irregular Astigmatism in Cataract Surgery

- Principles
 - Evaluate the source of the problem
 - Address to reduce magnitude of irregularity
 - Proceed to IOL Calculations and Surgery:

When astigmatism is compatible with potential good vision



Thank you...



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