

**New topographic custom ablation
procedure for treating irregular
astigmatism post keratoplasty with high
frequency (1 KHz) excimer laser.**

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On what information do we base our CA planning in virgin eyes?

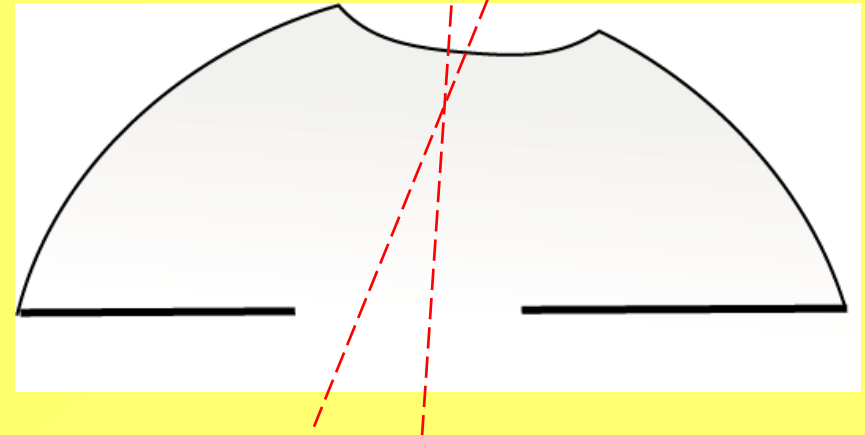
- Ablation planning has traditionally been based on information that reflect visual function
 - M.R., Autorefractometry, WF aberrometry, Placido based topography
 - Data dependent on patients fixation
 - Information (maps) is referenced to the rotational position of the fixating eye
- Such concept seems to be logical and has been highly successful in treatments of spherocylindrical errors and even High Order Aberrations in virgin eyes
 - As the goal of the surgery is **improvement of a well functioning intact visual system**

On what information can we base our ablation planning in IA?

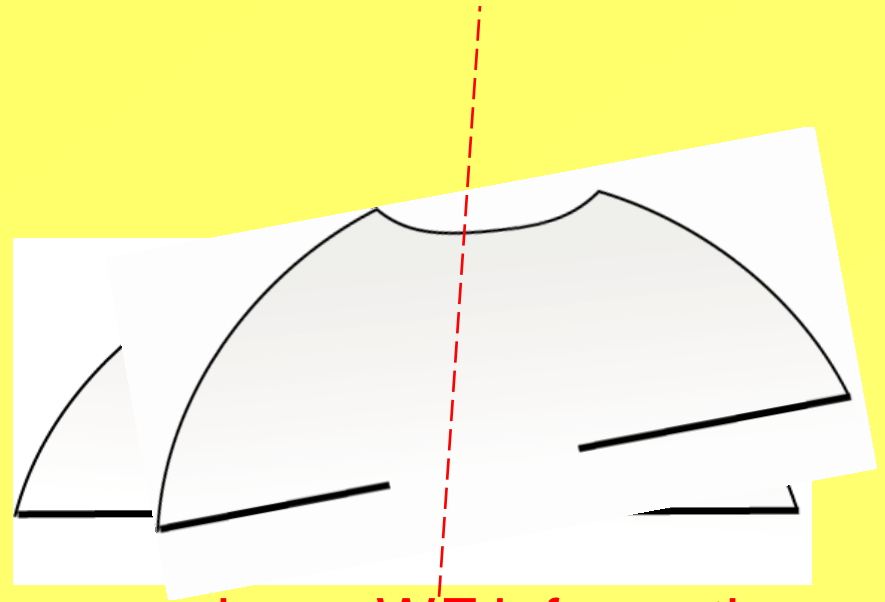
• Can we apply the same reasoning to the treatment of induced **asymmetric** corneal irregularities?

— Irregular corneal optics radically change the eye's visual optics

- Visual axis is forced to move from its original (physiologic) position to a new position
- As the eye with decentered/irregular corneal optics attempts to place the target in focus



- Eye with Irregular corneal optics assumes a new rotational position so that **x, y position of the corneal intercept of visual axis and its tilt change**



- An ablation plan, that uses topography or W/F information referenced to the visual axis, would attempt to **optimize the corneal optics on the basis of a pathological rotational position**

What kind of information is used by current technologies?

- Information bound to **visual axis / line of sight**:
 - - Wavefront guided
 - Topography guided - based on placido ring information ("corneal wavefront")
- Information reflecting global 3D **corneal morphology** independent on the visual axis
- **Topography guided - based on elevation data (acquired by triangulation)**

“ C I P T A ”

What consequences the use of the two concepts has in treatments of IA?

- The most important issues in **treatments of eyes with irregular astigmatism are:**
 - Corneal tissue sparing = crucial in previously treated cases or where a lamella has been placed
 - Smooth transition towards the untreated cornea (= Biologic tolerance = Better chance for a permanent effect)

Purpose

To evaluate the efficacy and safety of topographic guided ablation using a new scheimpflug image based topographer. All eyes show an irregular corneal astigmatism post keratoplastic surgery not correctable with spectacles. Objective was to regularize the anterior cornea surface to eliminate the cylindrical component of manifest refraction due to the cornea.

Materials and Methods

Population

Ten eyes of 10 patients (mean age 44.6 ± 14.57 yrs; range 25 to 56) underwent a custom refractive surgery..

- 10 eyes
- 10 patients : 7♂ and 3♀
- Mean Age: 44.6 y.o., range (25– 56).
- Follow up: 6-15 months Mean 10.5

Inclusion Criteria:

- CORNEAL THICKNESS $\geq 400\mu$
- ENDOTHELIAL CELL COUNTS ≥ 2000
- KERATOPLASTY PERFORMED FROM ONE YEAR AT LEAST
- ASTIGMATISM > 6 D
- BCVA 1./20.

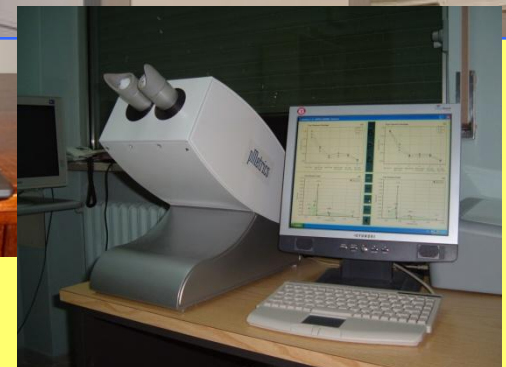
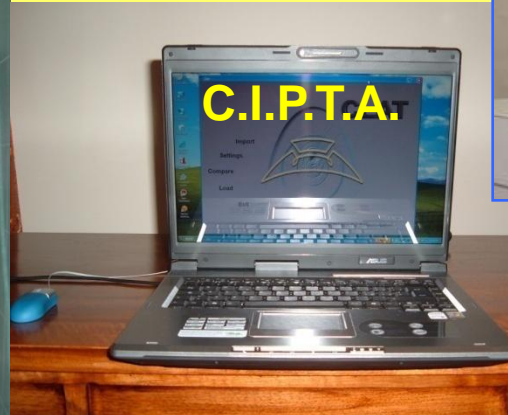
Exclusion Criteria

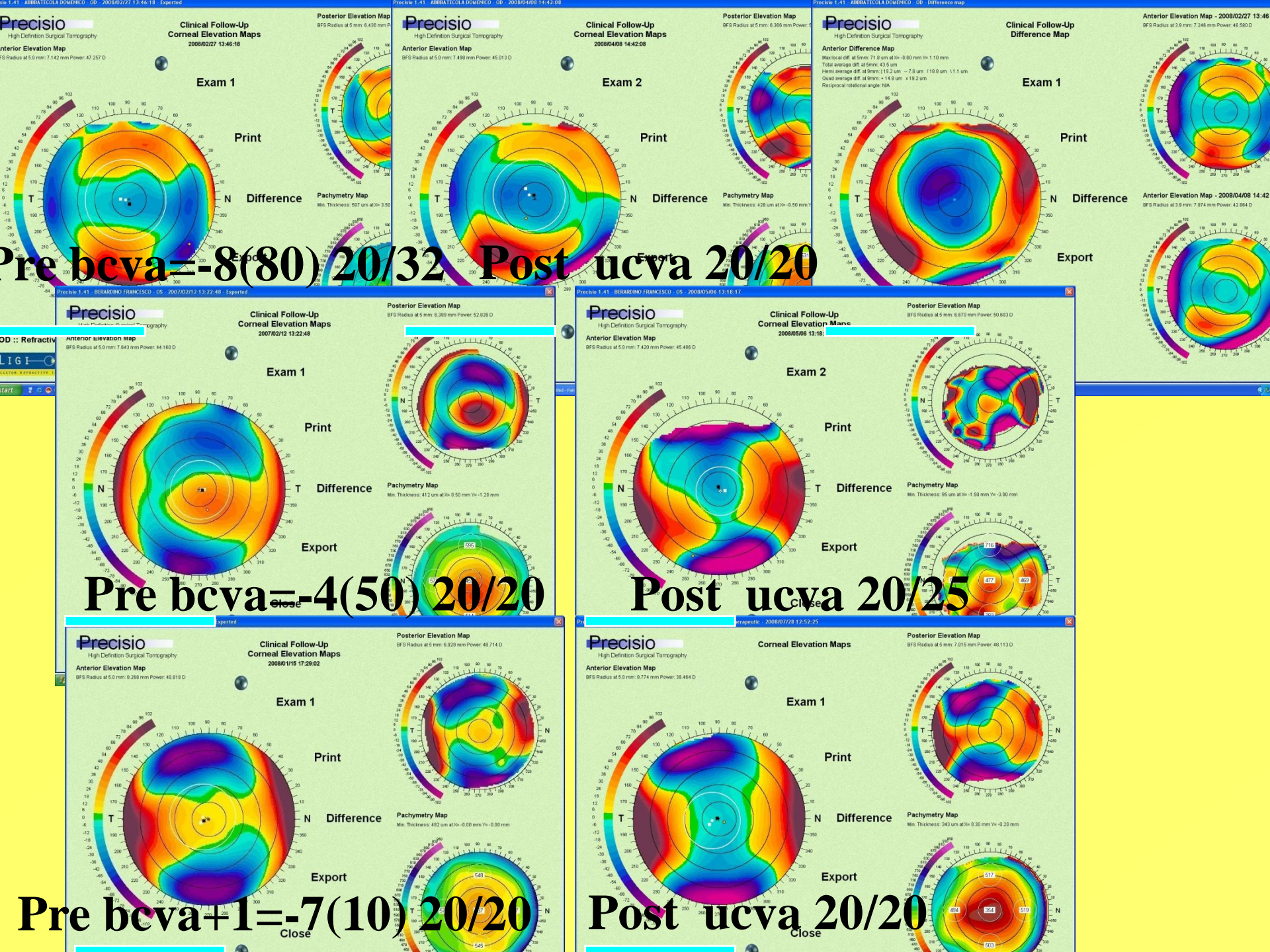
- Any ocular disease
- Ocular Trauma
- Systemic Steroid or immunosuppressive therapy
- Dismetabolic payology

Materials and Methods

The iVis Platform

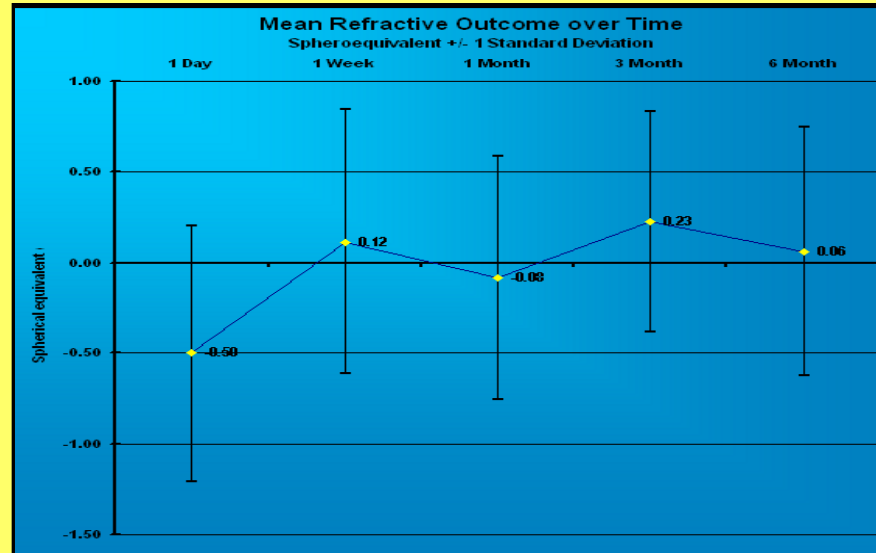
All patients were treated in transepithelial procedure with the italian excimer laser IRES 1,000 Hz (iVIS Technologies, Taranto, Italy). The ablation profile, calculated by CIPTA software (iVIS), was based upon Topography (Precisio, iVIS). The transepithelial excimer laser ablation was planned to leave a regular and smooth anterior surface of the cornea. All treatments were planned controlling the transition zone curvature over the transplanted cornea to reduce the possibility of any regression process related to the epithelium





Results

Six Months follow up



All eyes were re-epithelialized within 7 days. At a minimum of six months follow-up, the best spectacle corrected visual acuity improved from the pre-op mean values of 20/32 to 20/20 post-operatively, the uncorrected visual acuity improved from the pre-op mean values of 20/125 to 20/32 post-operatively and the mean corneal astigmatism was reduced from a mean of $8.0D \pm 2.73$ to $1.75D \pm 0.25$. The topographic pattern improved showing a regular cornea surface in all eyes. No adverse events have been reported neither during the surgery and the followup period.

Conclusion

Topography guided customized ablation combined with an ultrafast excimer laser with transepithelial procedure is a safe and effective technique for treating irregular astigmatism post keratoplasty, improving the patient's VA and his quality of vision.

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