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Eye Clinic
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"ULTRAFAST EXCIMER LASER FOR TRANS-EPITHELIAL CUSTOMIZED PHOTOREFRACTIVE SURGERIES: *CLINICAL RESULTS WITH 6 MONTHS FOLLOW UP"*

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ESCRS - Lisbon, 10 September 2005

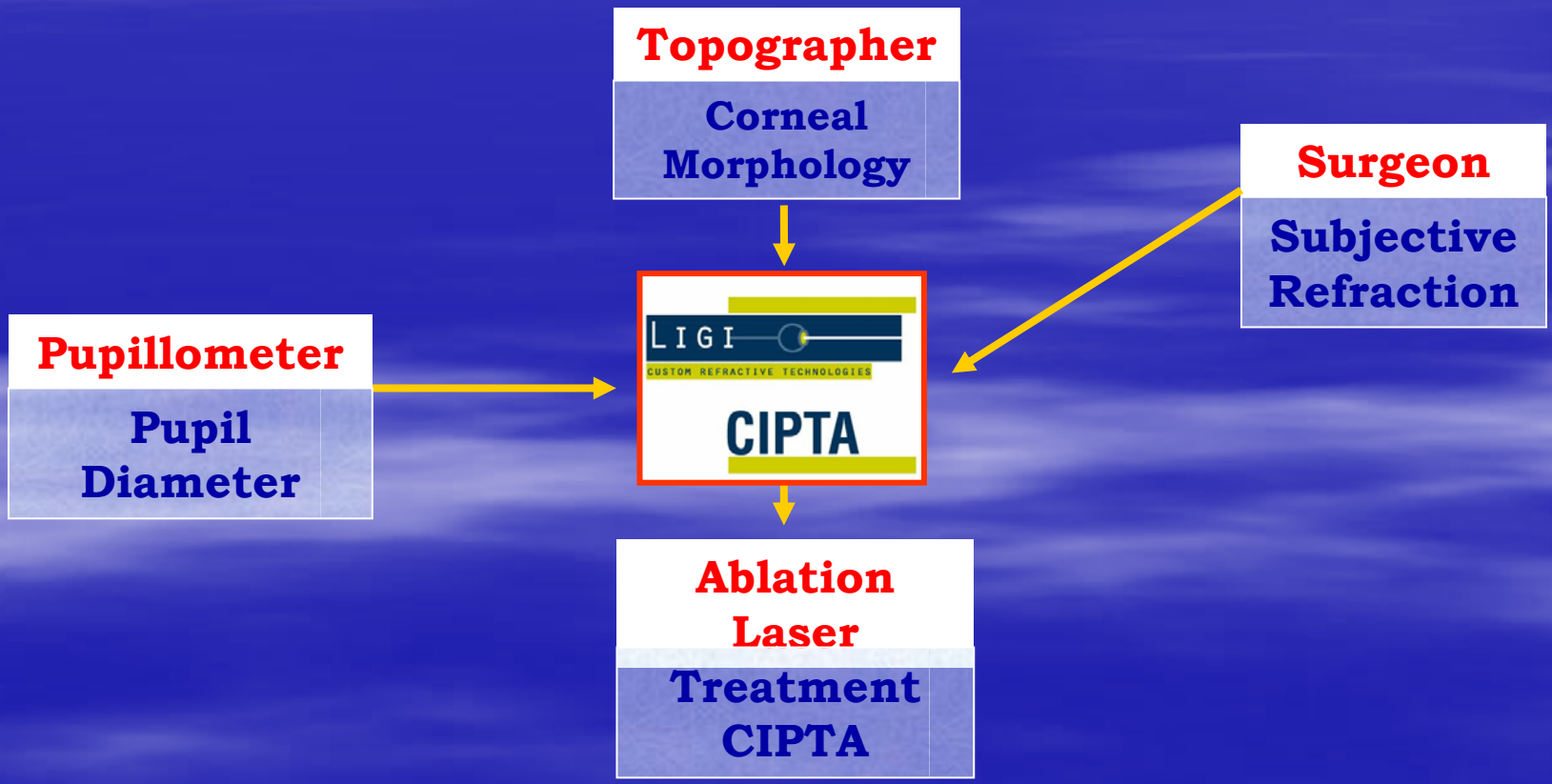
TOPOGRAPHICALLY–GUIDED PHOTOREFRACTIVE KERATECTOMY (PRK)

Advantages

- ✓ *Better astigmatic correction*
- ✓ *Possibility of correcting irregular astigmatism*
- ✓ *Smaller ablation volume compared with standard treatments*
- ✓ *Better visual performance*

Ligi Custom Ablation Platform

An integrated system of devices and software which is used to customize refractive and therapeutic surgery specific to each patient's



Custom Ablation Platform

This process occurs in three phases:

Acquisition

Corneal Morphology	+	Refractive Error	+	Pupillary Dynamics
↓		↓		↓
Tomography unit		Subjective Refraction or Refractometer		Dynamic Pupillometer

Pupillometry

The pupillometer calculates the *"Ideal Pupil"*, used to choose the useful optic zone minimizing the tissue ablation

Ideal Pupil **= pupil diameter during 95% of all circumstances typically encountered by patient during his/her life:**

- ✓ **Dark room**
- ✓ **Artificial light open space**
- ✓ **Night driving**
- ✓ **Artificial light close space**
- ✓ **Day light close space**
- ✓ **Day light open space**

CIPTA

(Corneal Interactive Programmed Topographic Ablation)

The treatment setup requires the following parameters:

- ✓ Center of the ablation
- ✓ Center of the laser reference system
- ✓ Axis of the ablation profile
- ✓ Photopic pupil
- ✓ Optimized pupil
- ✓ Outer transition diameter
- ✓ Refractive correction
- ✓ Asphericity
- ✓ Procedure type
- ✓ Thickness and width of automatic debridement (optional)

iRES
The Ultrafast Excimer Laser

- ✓ Frequency = 1000 Hz
- ✓ Gaussian flying spot = 650 μm
- ✓ Constant delivery frequency per area
- ✓ Setup / Calibration = totally automated

Purposes of the study

Evaluation of efficacy, predictability, safety and stability of topographically-guided transepithelial PRK using CIPTA software program with iRES ultrafast excimer laser

Patients and Methods

- ✓ **29 eyes** (13 RE, 16 LE)
- ✓ **21 patients** (14 F, 7 M)

Age: 31.9 ys ± 5.74 SD (range, 25-52)

Minimum Follow-up: *6 months*

Preoperative ophthalmic examination

- ✓ Slit-lamp biomicroscopy
- ✓ Tonometry
- ✓ Anterior and posterior corneal topography, 3-D pachymetry
- ✓ Dynamic pupillometry
- ✓ Uncorrected visual acuity (UCVA)
- ✓ Best spectacle-corrected visual acuity (BCVA) measured (cycloplegia)
- ✓ Specular endothelial microscopy

Preoperative data

	UCVA	BCVA	SE (D)	Central Corneal Thickness (μm)	Endothelial Cell density (Cell / mm^2)
Mean ± SD (range)	20/25 ± 20/125 (20/600 to 20/30)	20/20 (20/20)	-3.64D ± 1.45 (-8.25 to -2)	558.83 ± 32.04 (502 to 636)	2188.45 ± 67.22 (2074 to 2341)

Preoperative data

	Pupil (mm)	Optic zone (mm)	Transition zone (mm)
Mean ± SD (range)	5.94 ± 0.56 (5 to 7)	6.24 ± 0.59 (5 to 7.1)	7.66 ± 0.62 (6.25 to 9.15)

RESULTS

UCVA

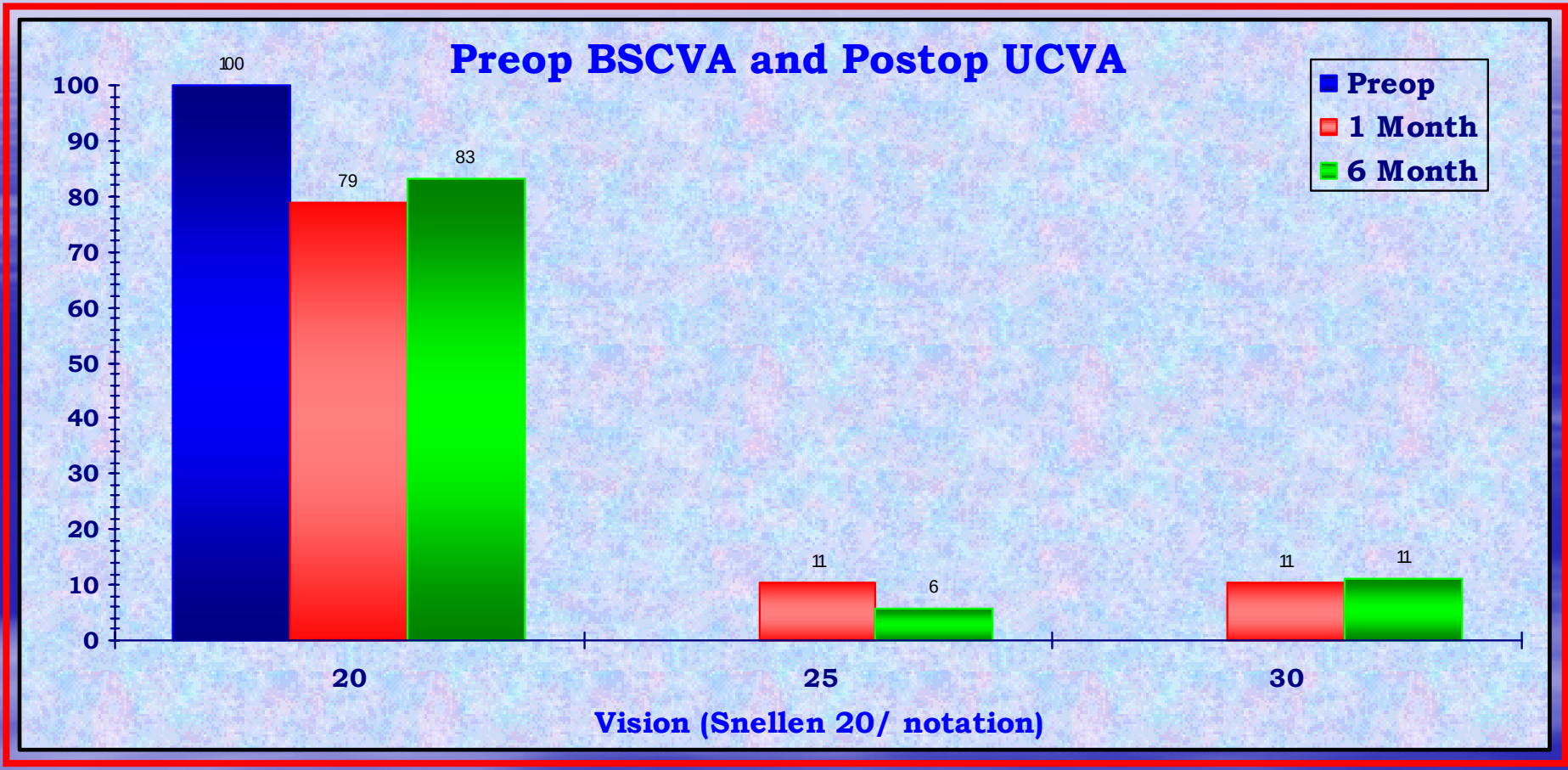
	Preop	2 weeks	1 month	3 months	6 months
Mean ± SD (range)	20/250 ± 20/125 (20/600 to 20/30)	20/25 ± 20/10 (20/60 to 20/20)	20/25 ± 20/12 (20/30 to 20/20)	20/25 ± 20/150 (20/30 to 20/20)	20/25 ± 20/125 (20/25 to 20/20)

RESULTS

BCVA

	Preop	2 weeks	1 month	3 months	6 months
Mean ± SD (range)	*20/20* *(20/20)*	20/25 ± 20/10 (20/60 to 20/20)	20/25 ± 20/10 (20/60 to 20/20)	20/25 ± 20/150 (20/30 to 20/20)	20/20 (20/20)

RESULTS



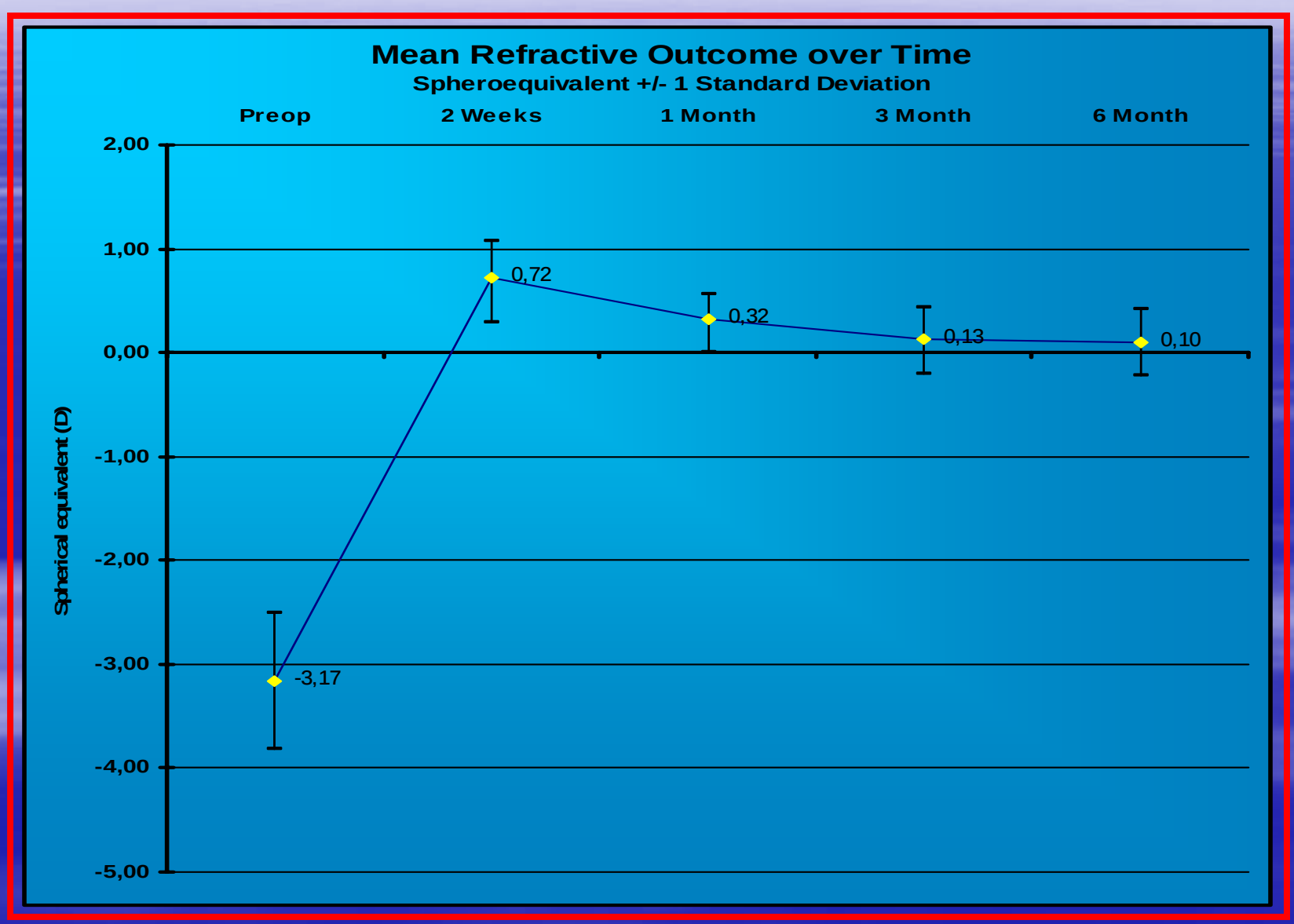
After 6 months f-up 83% of the eyes had an UCVA of 20/20

RESULTS

Sphere Equivalent

	Preop (D)	2 weeks (D)	1 month (D)	3 months (D)	6 months (D)
Mean ± SD (range)	-3.17 ± 1.45 (-8.25 to -2)	0.72 ± 0.24 (+0.75 to +1.25)	0.32 ± 0.23 (+0.25 to +0.75)	0.13 ± 0.25 (-0.50 to +0.75)	0.10 ± 0.28 (-0.75 to +0.75)

RESULTS


Mean Refractive Outcome over Time
Spheroequivalent +/- 1 Standard Deviation
Preop
2 Weeks
1 Month
3 Month
6 Month
2,00
1,00
0,00
-1,00
-2,00
-3,00
-4,00
-5,00
Spherical equivalent (D)
-3,17
0,72
0,32
0,13
0,10

RESULTS

	Pre-op CCT (μm)	Estimated Maximum Ablation Depth (μm)	6 months post-op CCT (μm)
Mean ± SD (range)	558.83 ± 32.04 (502 to 636)	79.044 ± 30.56 (38 to 136)	500.68 ± 43.74 (421 to 561)

25% less

RESULTS

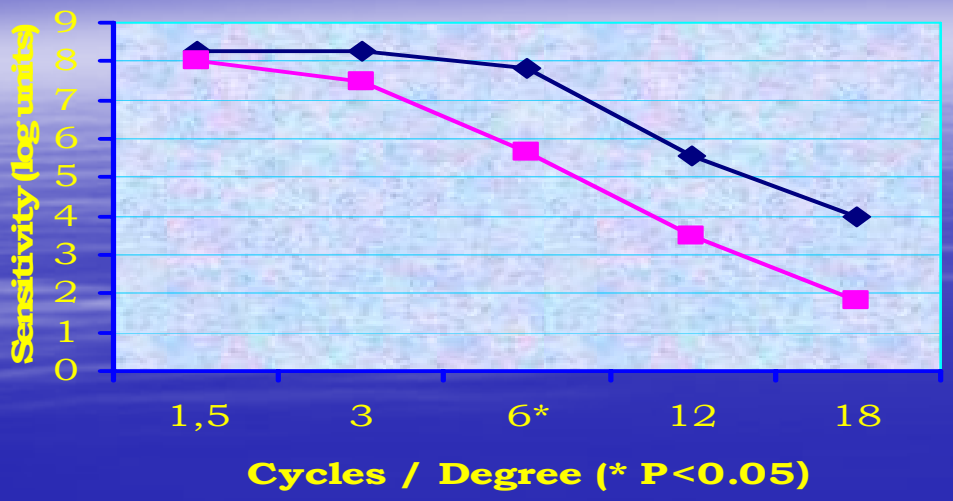
	Endothelial Cell density (Cell / mm^2)	Endothelial Cell density (Cell / mm^2)
Mean ± SD (range)	2188.45 ± 67.22 (2074 to 2341)	2088.56 ± 71.34 (2017 to 2159)

p>0.005

Contrast Sensitivity

- ✓ CSV-1000 Contrast Sensitivity test
- ✓ 4 contrast levels
- ✓ (1.5- 18 cycles/degree)
- ✓ BSCVA
- ✓ 6 months post-op

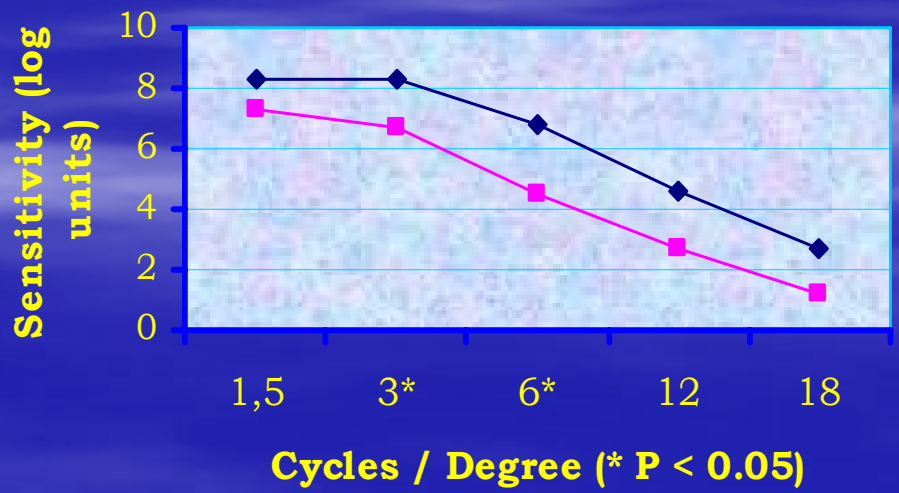
Photopic Contrast Sensitivity

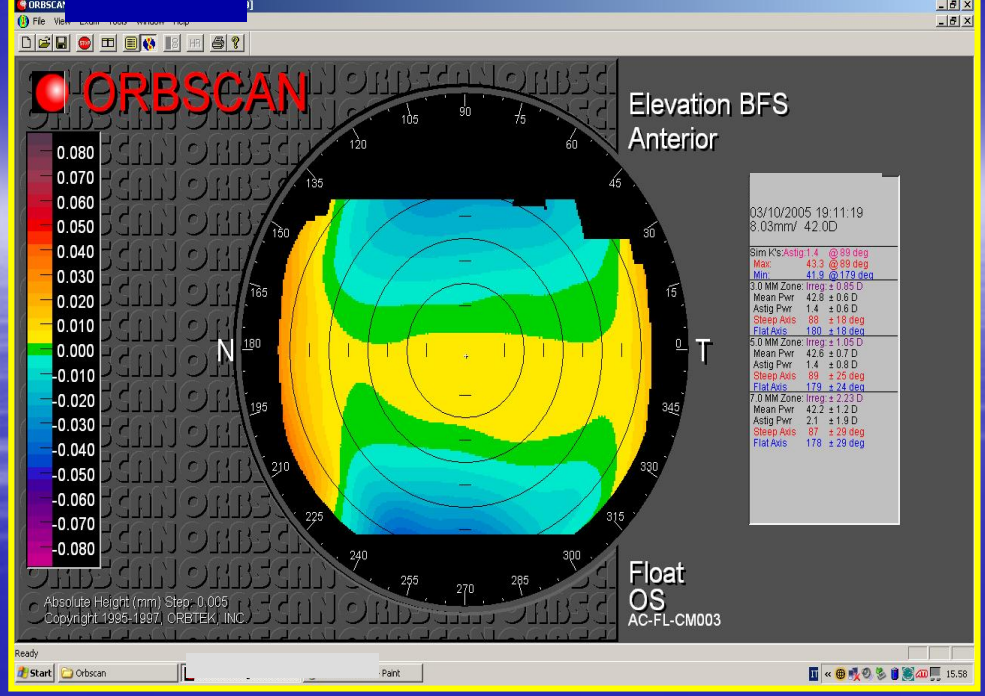


Pre-op.

Post-op.

Mesopic Contrast Sensitivity





P.L., F, 36 ys

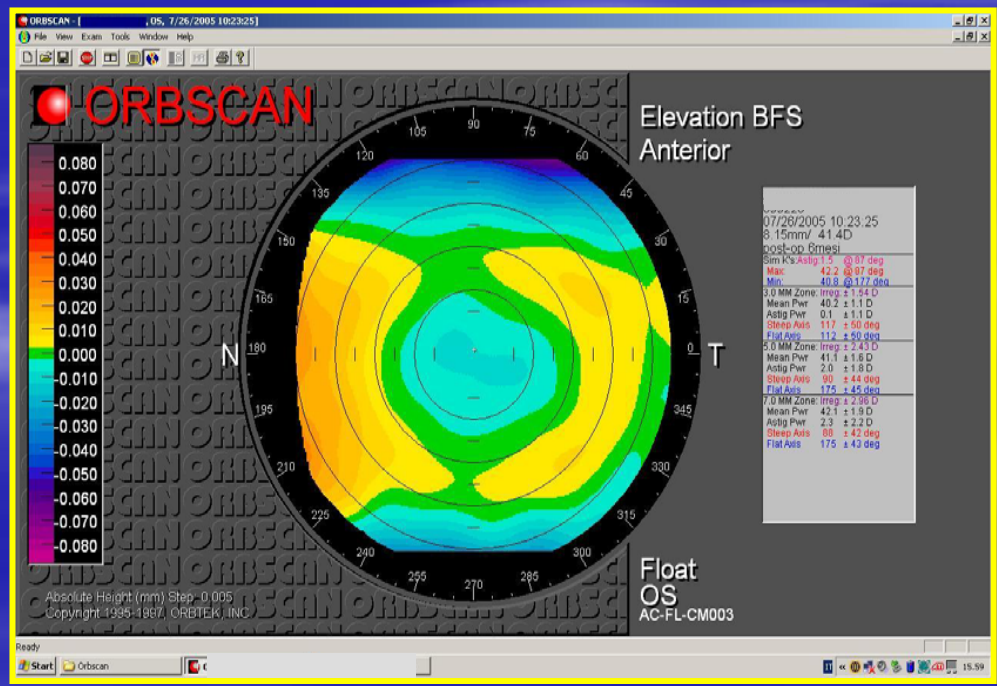
Pre-op

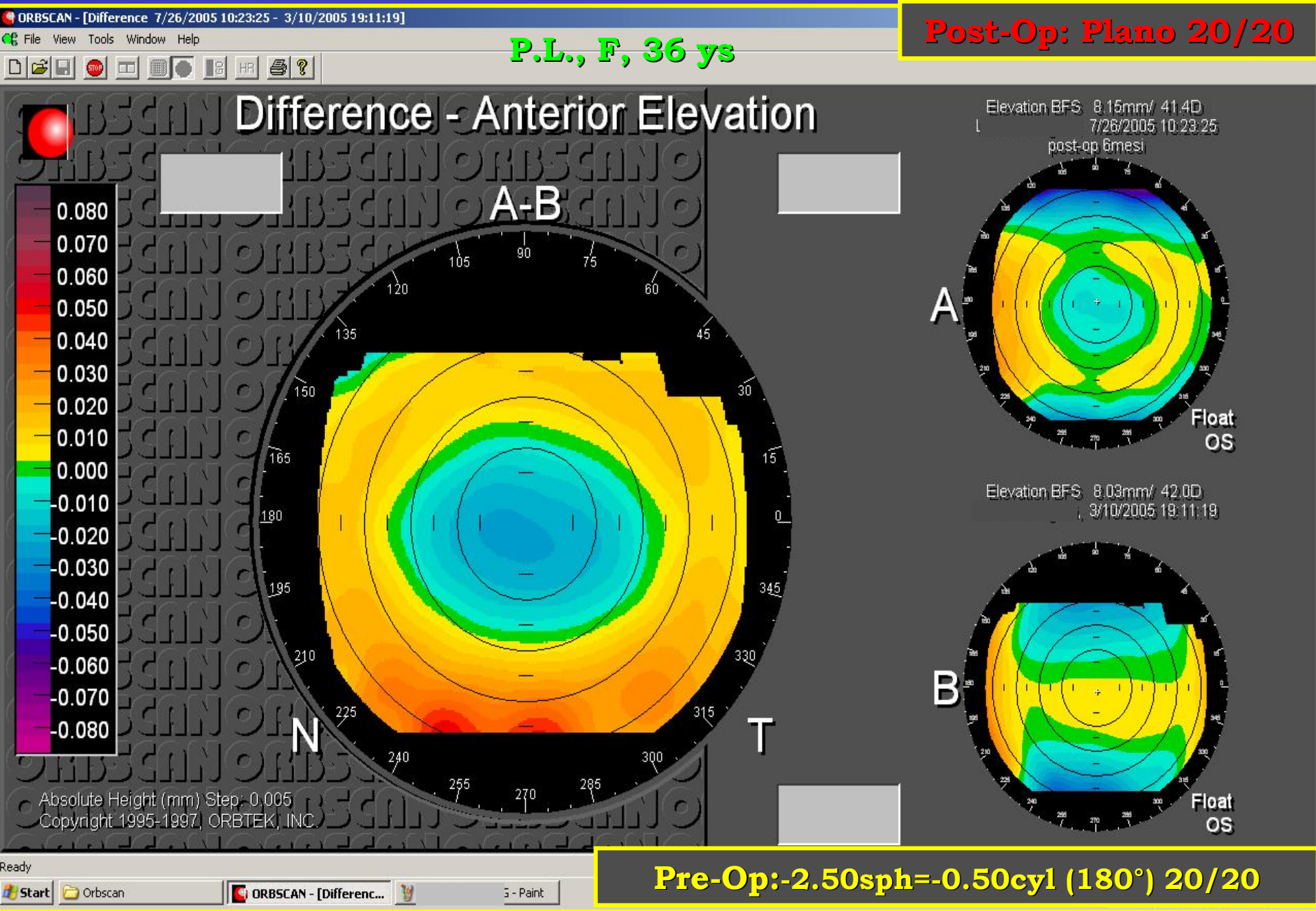
-2.50sph = -1.50cyl (180°)

20/20

Post-op

PLANO 20/20




ORBSCAN - [Difference 7/26/2005 10:23:25 - 3/10/2005 19:11:19]
File View Tools Window Help
P.L., F, 36 ys
Post-Op: Plano 20/20
Difference - Anterior Elevation
A-B
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Absolute Height (mm) Step: 0.005
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Elevation BFS 8.15mm/ 41.4D
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post-op 6mesi
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Elevation BFS 8.03mm/ 42.0D
3/10/2005 19:11:19
B
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OS
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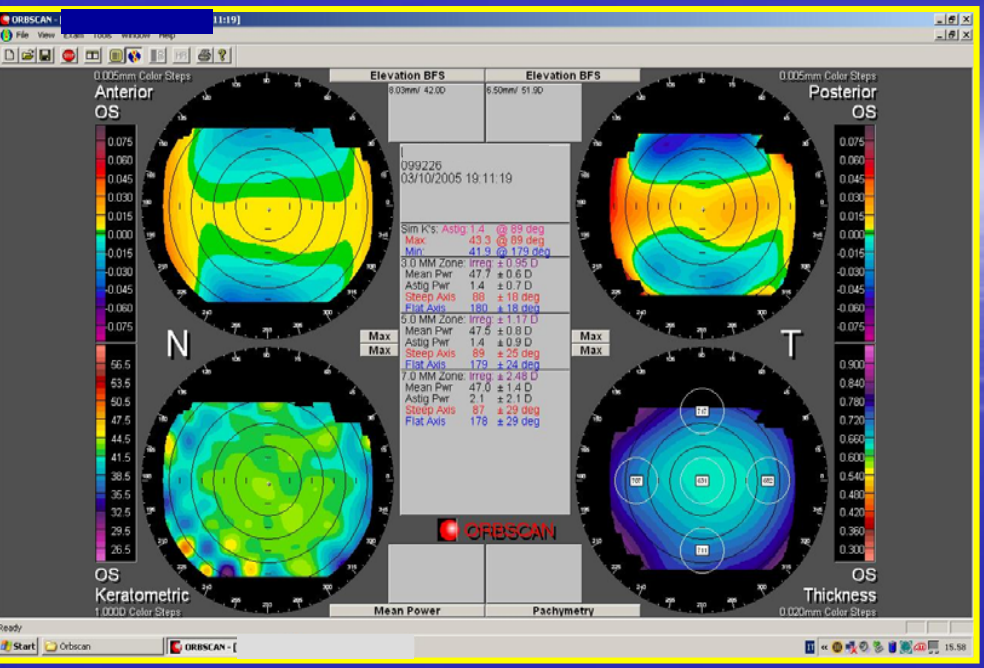
- Paint
Pre-Op:-2.50sph=-0.50cyl (180°) 20/20

P.L., F, 36 ys

Pre-op

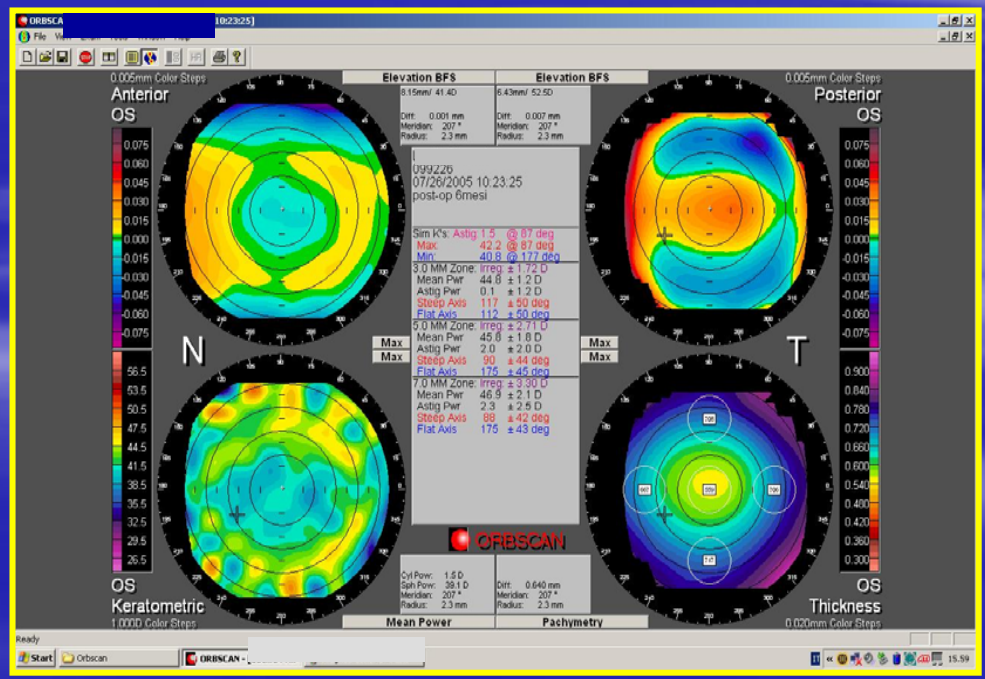
-2.50sph = -1.50cyl (180°)

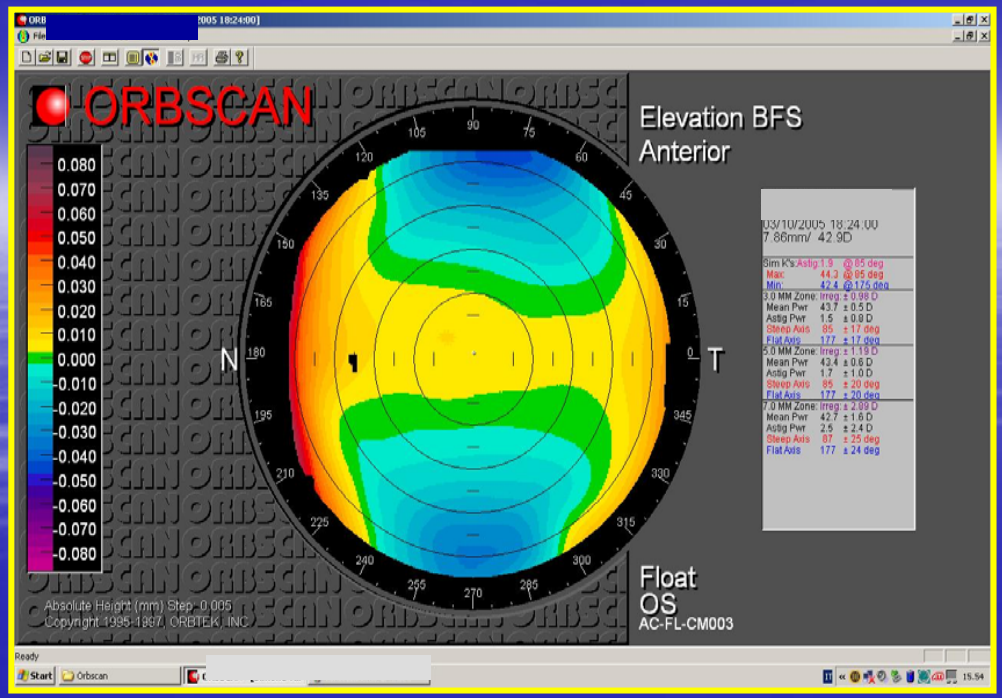
20/20



Post-op

PLANO 20/20





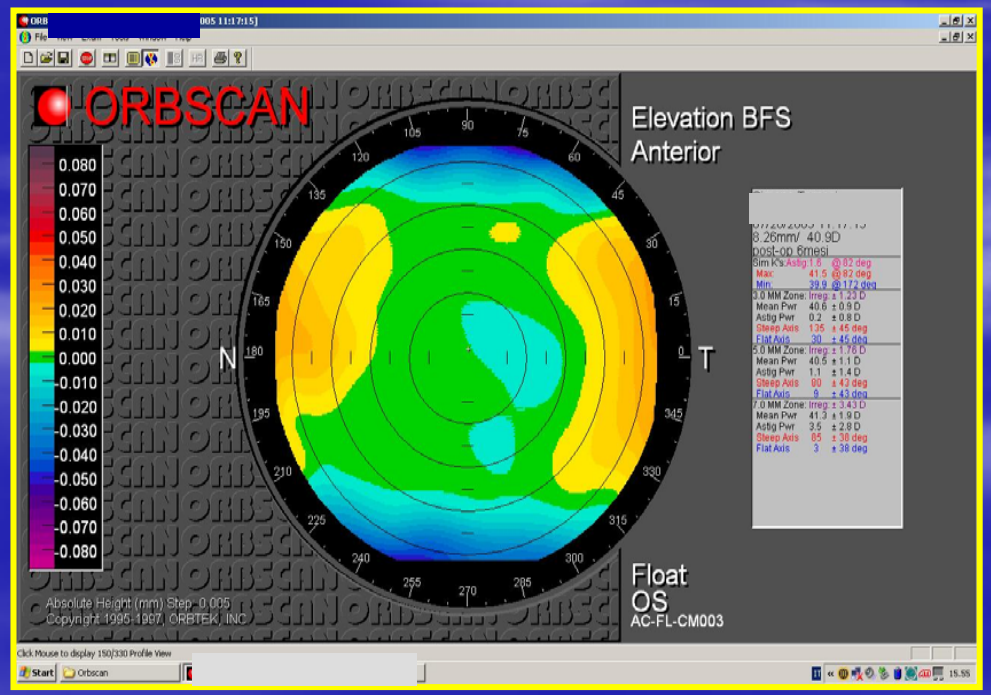
T.S., F, 32 ys

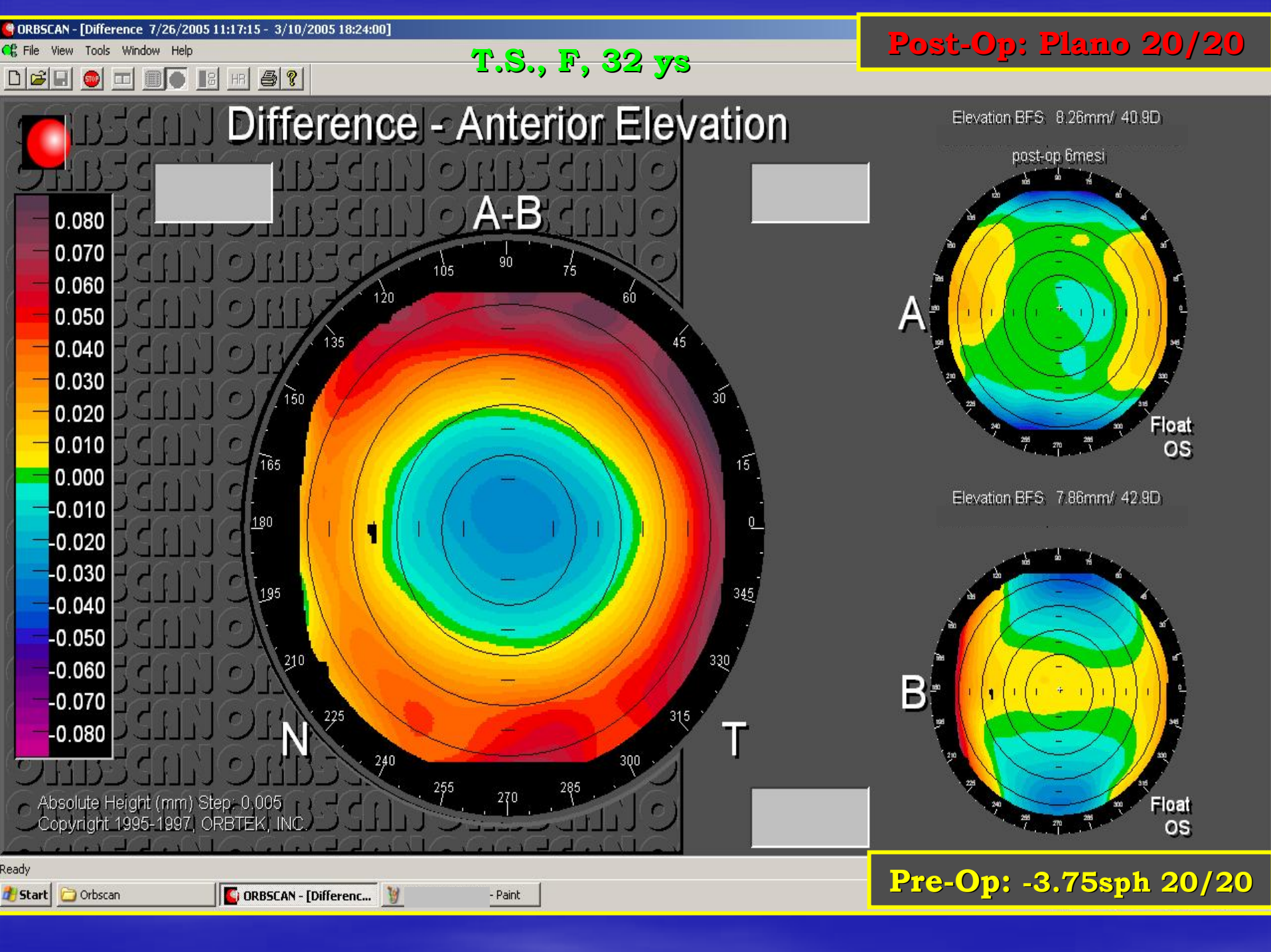
Pre-op

-3.75sph 20/20

Post-op

PLANO 20/20




ORBSCAN - [Difference 7/26/2005 11:17:15 - 3/10/2005 18:24:00]
File View Tools Window Help
T.S., F, 32 ys
Post-Op: Plano 20/20
Difference - Anterior Elevation
A-B
0.080
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-0.080
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Absolute Height (mm) Step: 0.005
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Elevation BFS 8.26mm/ 40.9D
post-op 6mesi
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OS
Elevation BFS 7.86mm/ 42.9D
B
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OS
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Start
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ORBSCAN - [Differenc...
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Pre-Op: -3.75sph 20/20

CONCLUSIONS

The correction of refractive errors (also with irregular astigmatism) using transepithelially the topographically-guided iRES ultra-fast excimer laser may be considered safe and effective with stable visual outcome