

Università degli Studi di Catania

Clinica Oculistica

Direttore: Prof. A. Reibaldi

CROSS - LINKING TRANSEPITELIALE : *nostra esperienza*

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C. Cassar Scalia*

**XXXVI CONGRESSO SOSI
ACIREALE 14-15-16 APRILE 2011**



TECNICA TRANSEPITELIALE

- Riboflavina 0,1% + enancher (trometamolo + EDTA)
- Evitare il dolore post operatorio
- Evitare il peggioramento del visus nei primi 2 mesi
- Assenza di complicanze legate alla disepitelizzazione (Haze)
- Possibilità di trattare pazienti piccoli o poc
- Possibilità di trattare “thinnest point” inferiori a 400 μm
- Reazione “cross-linkante” meno profonda (80-100 μm)



*Transepithelial corneal collagen cross-linking in keratoconus.
Leccisotti et Al - Epub 2010*

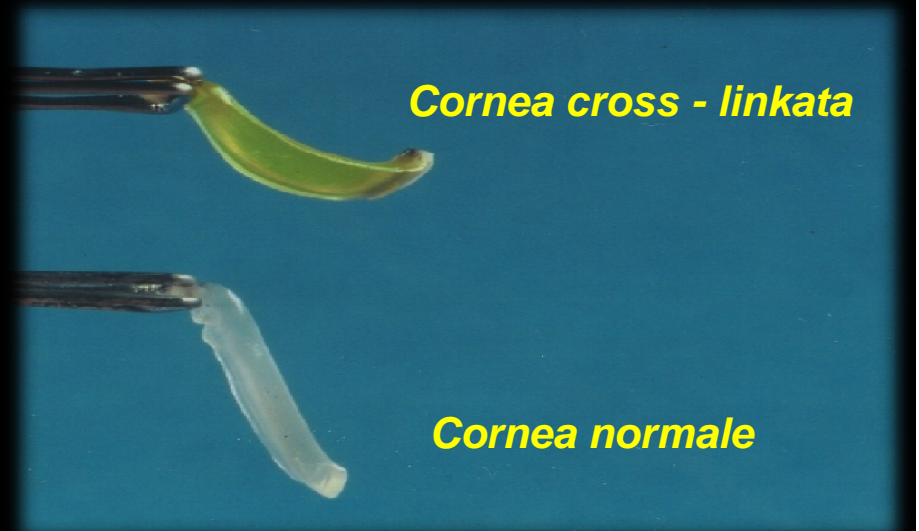
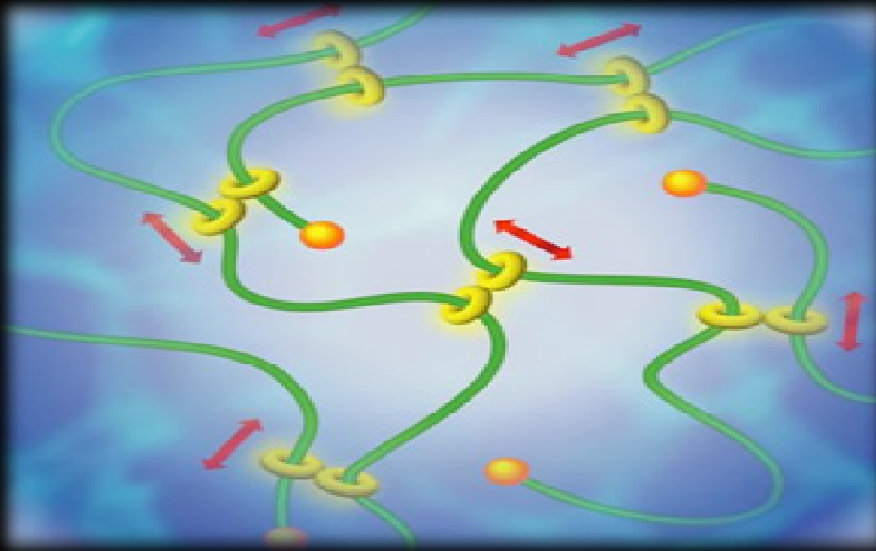
*Transepithelial Cross-Linking in patients candidates to corneal transplantation.
Clinical and histopatological evaluation.
J Refract Surg. 2010*

*Corneal crosslinking: Riboflavin concentration in corneal stroma exposed with and without epithelium
Stefano Baiocchi, et Al. - FRCS*



PROTOCOLLO DIAGNOSTICO

- **Visita oculistica (Foto segm.anteriore, BCVA ecc.)**
- **Topografia corneale altitudinale (Orbscan)**
- **Tonometria con Goldmann e Ocular Response Analyzer (O.R.A.)**
- **Microscopia Confocale (Confoscan 4)**



OCULAR RESPONSE ANALYZER (O.R.A. Reichert)

“Utilizza un rapido impulso d’aria ed un sistema elettro/ottico per registrare le due misurazioni della pressione delle applanazioni : una mentre la cornea si muove verso l’interno e l’altra durante il ritorno”.

Valuta :

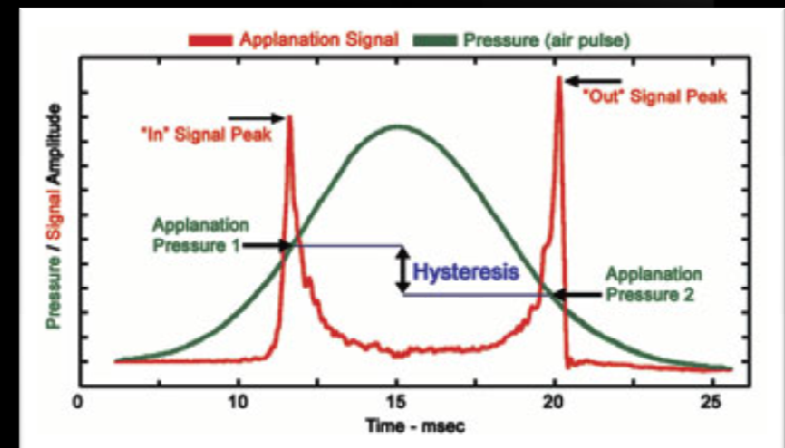
Pressione intraoculare goldmann ripetibile (IOP g)

Proprietà biomeccaniche del tessuto corneale(CH e CRF)

CH = corneal hysteresis (viscosità della cornea)

CRF = corneal resistance factor

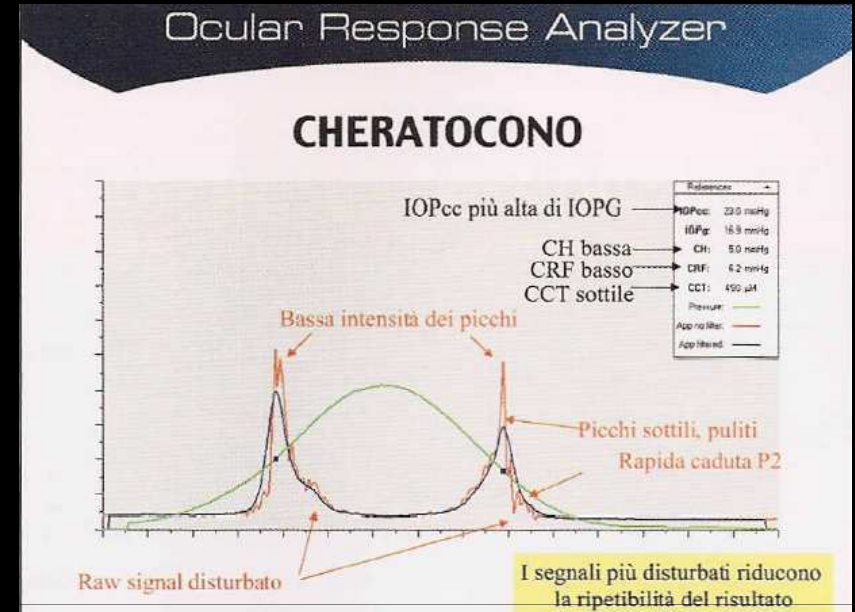
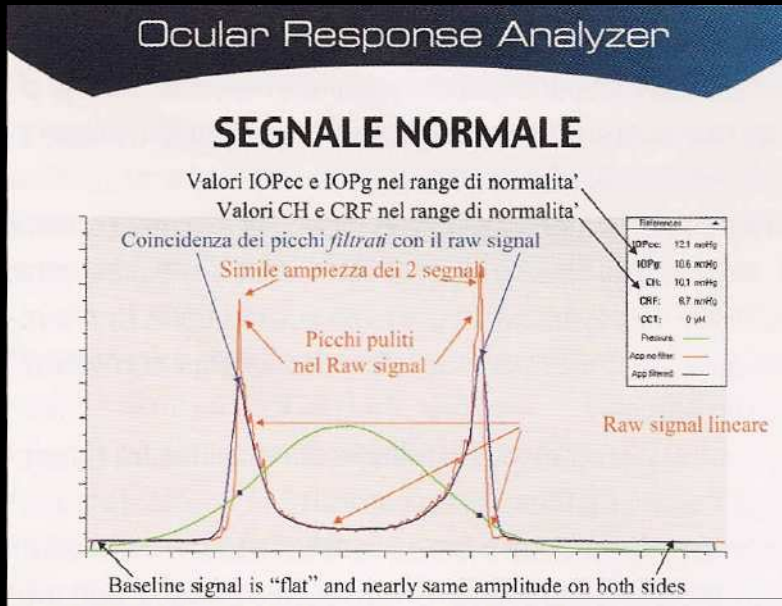
IOP cc = corneal compensated intraocular pressure



*Correlations between corneal hysteresis, intraocular pressure and corneal central pachimetry.
Tauboul D. et Al. – J.Cataract refractive surg. 2008*

*Evaluation of the influence of corneal biomechanical proprieties of intraocular pressure
mesurement using Ocular Response Analyzer.
Felipe Medeiros et Al. – J.Glaucoma 2006*

O.R.A. : CHERATOCONO e CROSS LINKING



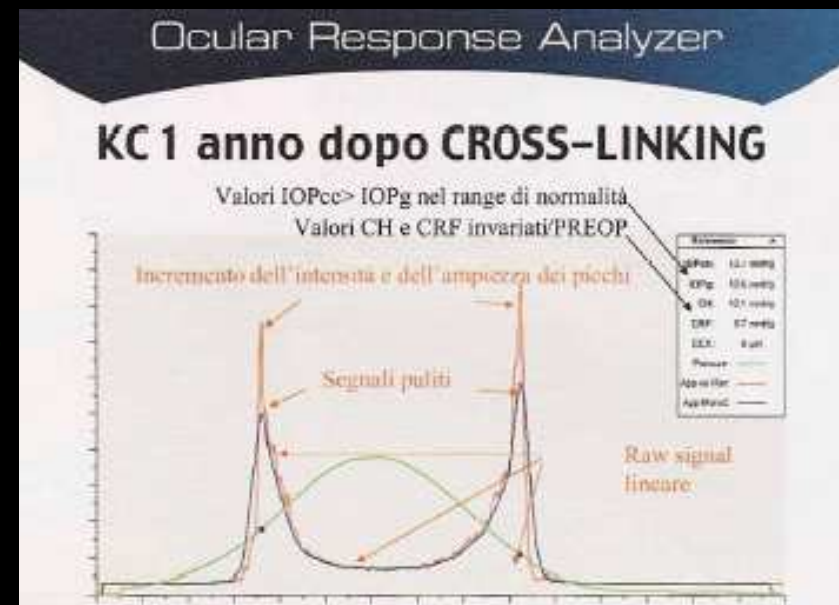
Maggiore affidabilità nella determinazione della IOP nelle cornee ectasiche e cross – linkate

Intra- and postoperative variation in ocular response analyzer parameters in keratoconic eyes after corneal cross-linking
P. Vinciguerra et Al. – J.Refractive surgery 2010

Biomechanical parameters of the cornea after collagen crosslinking measured by waveform analysis.
Sedaghat M. et Al. – J.Cataract Refractive surgery 2010

Detection of Biomechanical Changes After Corneal Cross-Linking Using Ocular Response Analyzer Software.
Spoerl E et Al. – J.Refractive Surgery 2011

Can we measure corneal biomechanical changes after collagen cross-linking in eyes with keratoconus?--a pilot study.
Goldich Y. et Al. - Cornea 2009



PROTOCOLLO

- Fase di **preparazione anestetica** con ossibuprocaina 0,4% collirio per 20 minuti
- Fase di **impregnazione** : Silicon Ring + Ricrolin T.E. con ricambio ogni 4 minuti per un totale di 30 minuti.
- Instillazione pilocarpina collirio a metà della fase di impregnazione
- Fase di **Irradiazione** : 6 steps da 5 minuti con CBM VEGA X-LINKER a **3 mW/cm²** con spot da 8 mm.
- Medicazione con Ofloxacina
- **Terapia: Ofloxacina coll.** (1x3) per 7giorni
Lacrime artificiali con aminoacidi monodose per 2 mesi
Aminoftal cpr. (2x2) a partire da 7 giorni prima del trattamento fino ad un mese dal trattamento
Aminoftal coll.monodose (1x3) a partire da un mese dal trattamento per 6 mesi

The role of Amino Acids in Corneal Stromal Healing : A metod for evalueting cellular density and extracellular matrix distribution
P.Vinciguerra et Al. – Journal of refractive surgery 2003

Morphological and functional correlations in Riboflavin UVA Corneal collagene Cross – Linking for keratoconus
A.Caporossi et Al. – Acta Ophthalmologica 2010

Use of Amino Acids in Refractive surgery
P.Vinciguerra et Al. – Journal of refractive surgery 2002



SCOPO DEL NOSTRO STUDIO

Valutare la variabilità dei parametri :

- clinici
- biomeccanici
- topografici
- fibre nervose peripapillari *

nei pazienti trattati con cross - linking T.E.

3664/D771

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Reproducibility Of Retinal Nerve Fiber Layer Thickness Measurements Using Spectral Domain Optical Coherence Tomography In Eyes With Keratoconus

Tuesday, May 03, 2011, 3:45 PM - 5:30 PM



May 1-5, 2011
Fort Lauderdale, Florida
www.arvo.org/am

MATERIALI

- 34 pazienti (40 occhi)
- Età media – 27 anni (ds ± 3,7)
- 19 femmine
- Follow – up di 6 mesi

CRITERI DI ESCLUSIONE:

- Lunghezza assiale > 26 mm
- Precedenti interventi chirurgici e parachirurgici oculari
- Glaucoma
- Patologie infiammatorie oculari (Uveiti e/o corioretiniti etc...)
- Patologie retiniche (distrofie, retinopatie proliferative, etc...)
- Cataratta e/o opacità dei mezzi diottrici
- Thinnest point <350 micron

CRITERI DI INCLUSIONE:

- Pz con cheratocono evolutivo (I–II–III stadio Amsler Krumeich)
- Documentata progressione con incremento della curvatura all'apice e/o diminuzione dello spessore del 2% in 6 mesi
- Assenza di opacità corneali
- Sospensione L.A.C. da almeno 1 mese

METODI

Baseline

BCVA

TOPOGRAFIA CORNEALE

O.R.A. : IOP_g - IOP_{cc}, CH - CRF

**OCT SPECTRALIS : misurazione fibre nervose
peripapillari**

MICROSCOPIA CONFOCALE



Nel follow – up tutti gli esami sono stati ripetuti a 1 – 3 – 6 mesi

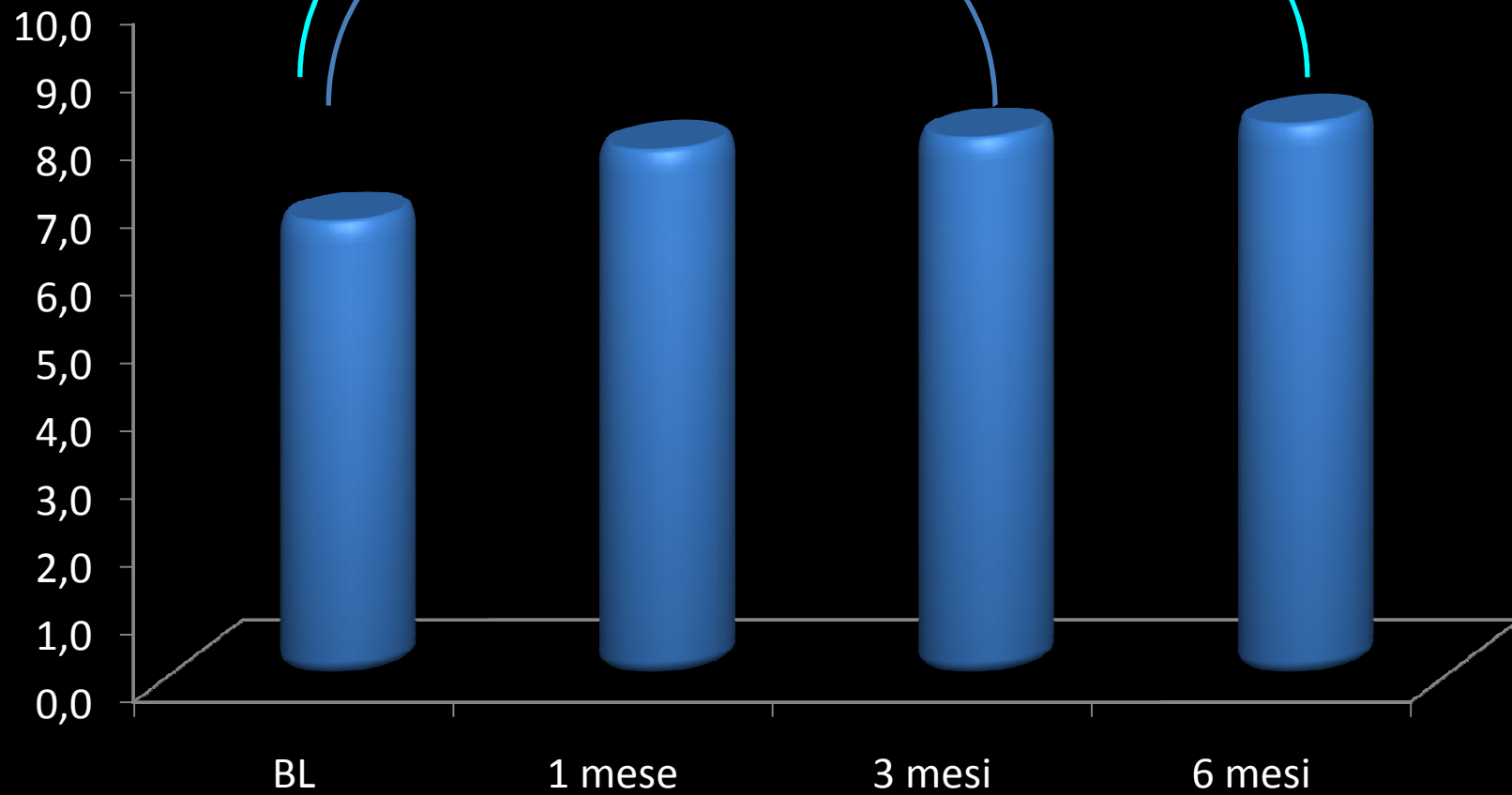
RISULTATI

ANOVA $p < 0.001$

BCVA

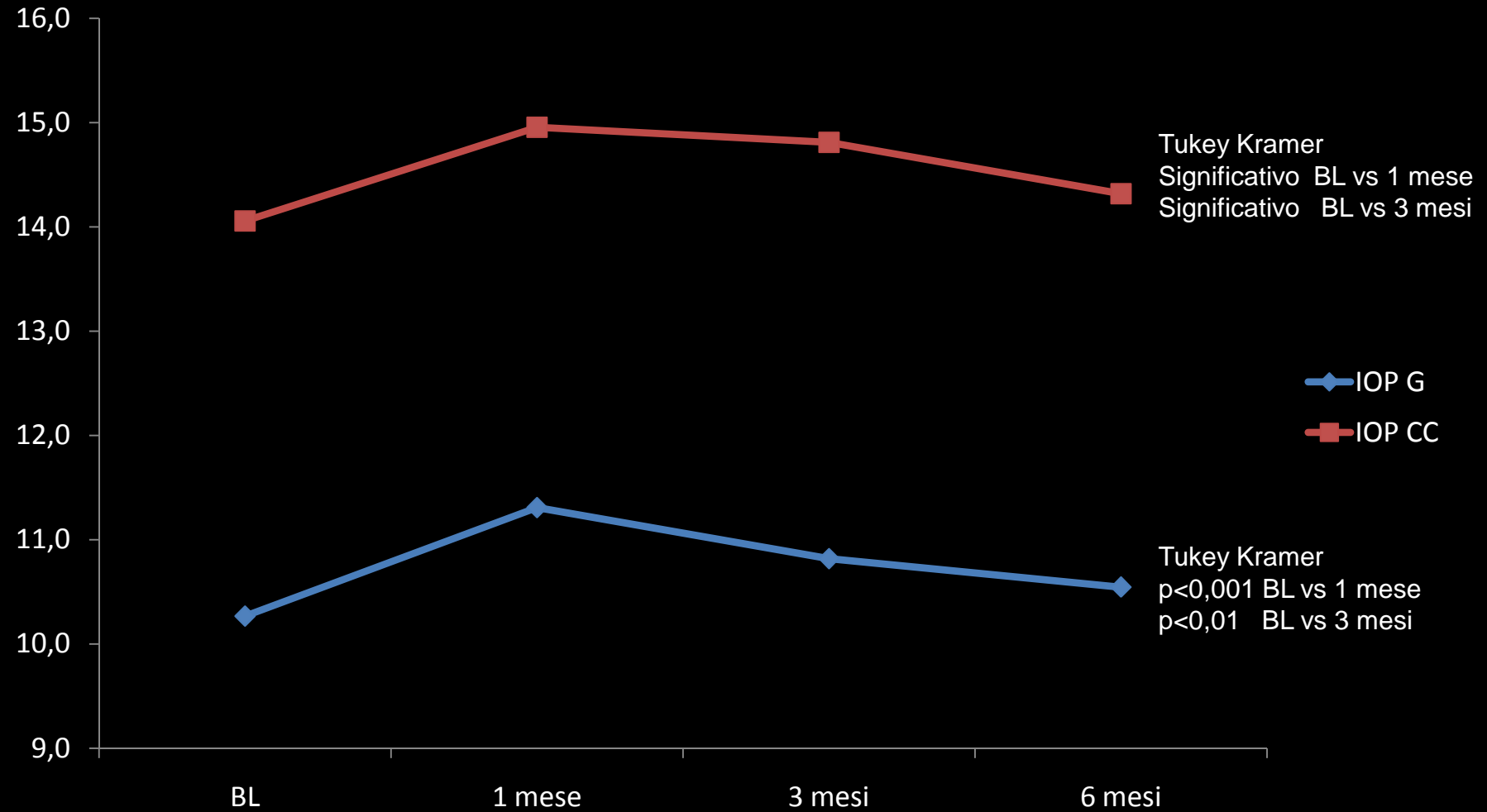
Tukey Kramer $p < 0,001$

$p < 0,001$



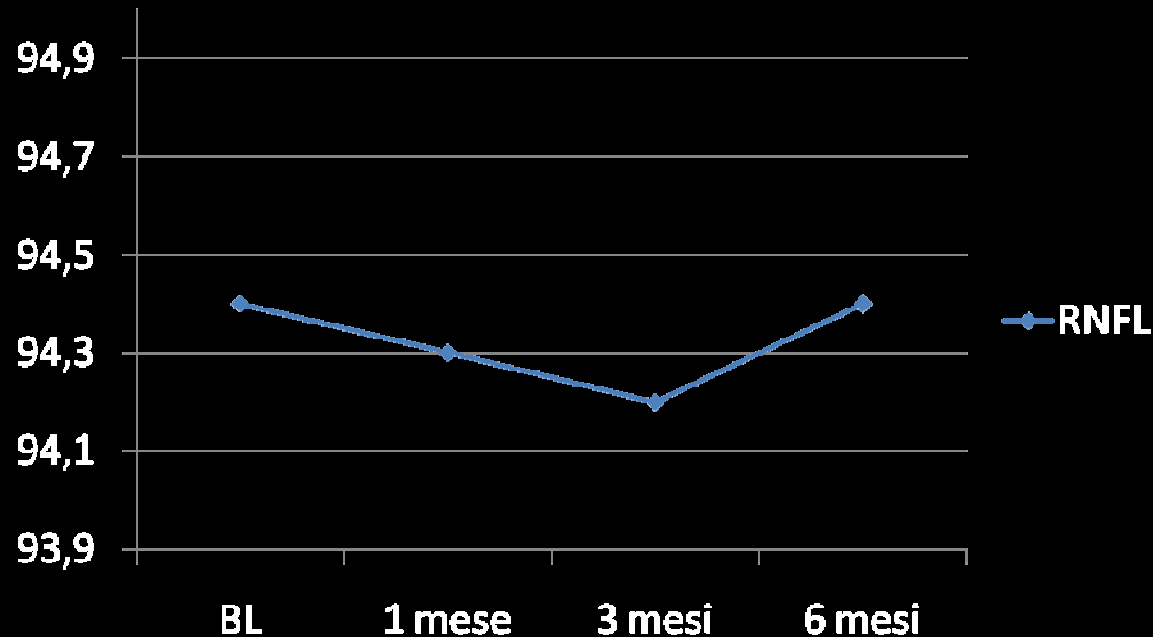
RISULTATI

IOP_{cc} / IOP_g



ANOVA p<0.001

SPESSORE MEDIO DELLE FIBRE NERVOSE RNFL



Keywords:

573 keratoconus; 607 nerve fiber layer; 551 imaging methods (CT, FA, ICG, MRI, OCT, RTA, SLO, ultrasound)

Abstract Body:

Purpose: To evaluate the reproducibility of the peripapillary retinal nerve fiber layer (RNFL) thickness measurements obtained by Spectralis spectral domain optical coherence tomography (OCT) in normal eyes and eyes with keratoconus.

Methods: Peripapillary RNFL thickness was evaluated with Spectralis spectral domain OCT (Heidelberg Engineering, Heidelberg, Germany). Measurements were repeated 3 times during the same visit using the follow-up function. One eye of each participant was randomly selected for statistical analysis. Reproducibility was evaluated using within-subject standard deviation (Sw), coefficient of variation (CV), and intraclass correlation coefficient (ICC).

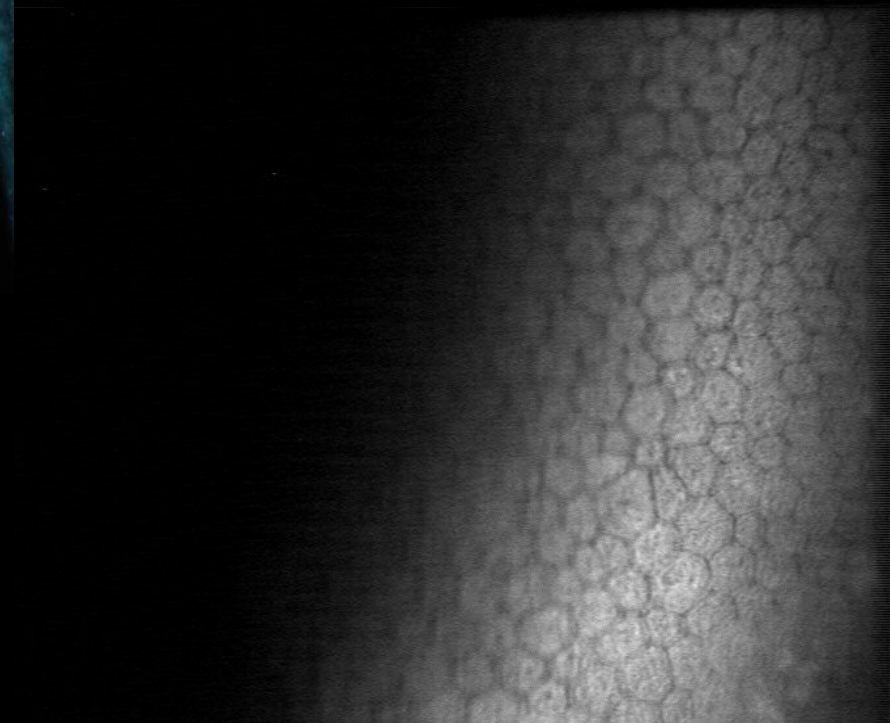
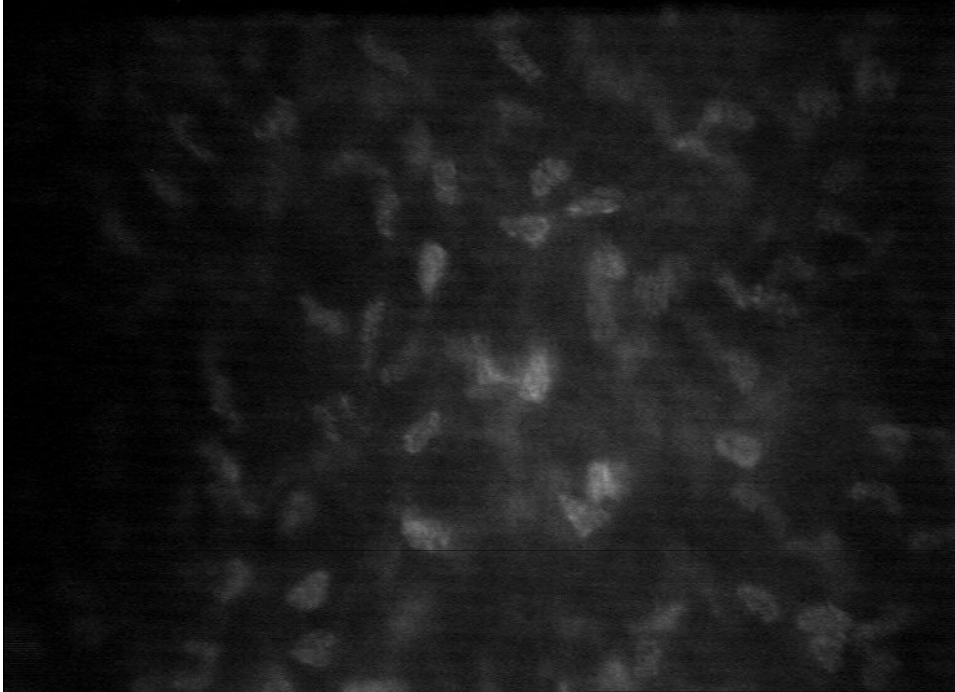
Results: Forty normal eyes and forty eyes with keratoconus were included in the study. The RNFL thickness overall global CV was 1.37% in normal eyes and 2.10% in eyes with keratoconus. The RNFL thickness overall global ICC (95% CI) was 0.987 (0,973-0,994) in normal eyes and 0.964 (0,926-0,984) in eyes with keratoconus. The RNFL thickness overall global Sw \pm 1.96 standard error was 1,66 \pm 0,22 μ m in normal eyes and 2,18 \pm 0,21 μ m in eyes with keratoconus

Conclusions: Spectralis OCT shows a very good reproducibility compared with normal eyes for measuring the peripapillary RNFL thickness in keratoconus eyes

ANOVA $p < 0.001$

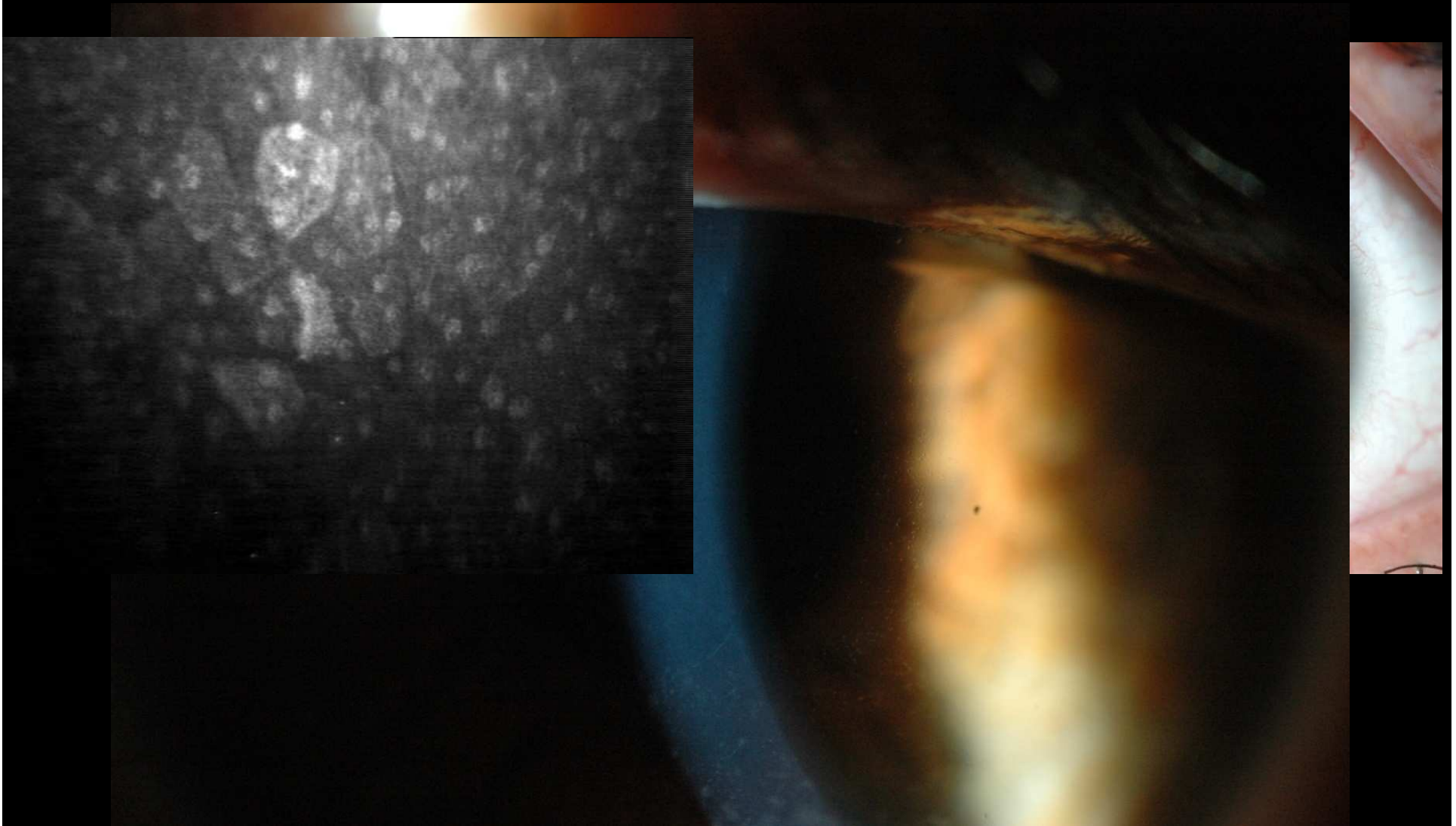
PRE TRATTAMENTO

T. F. 22 aa



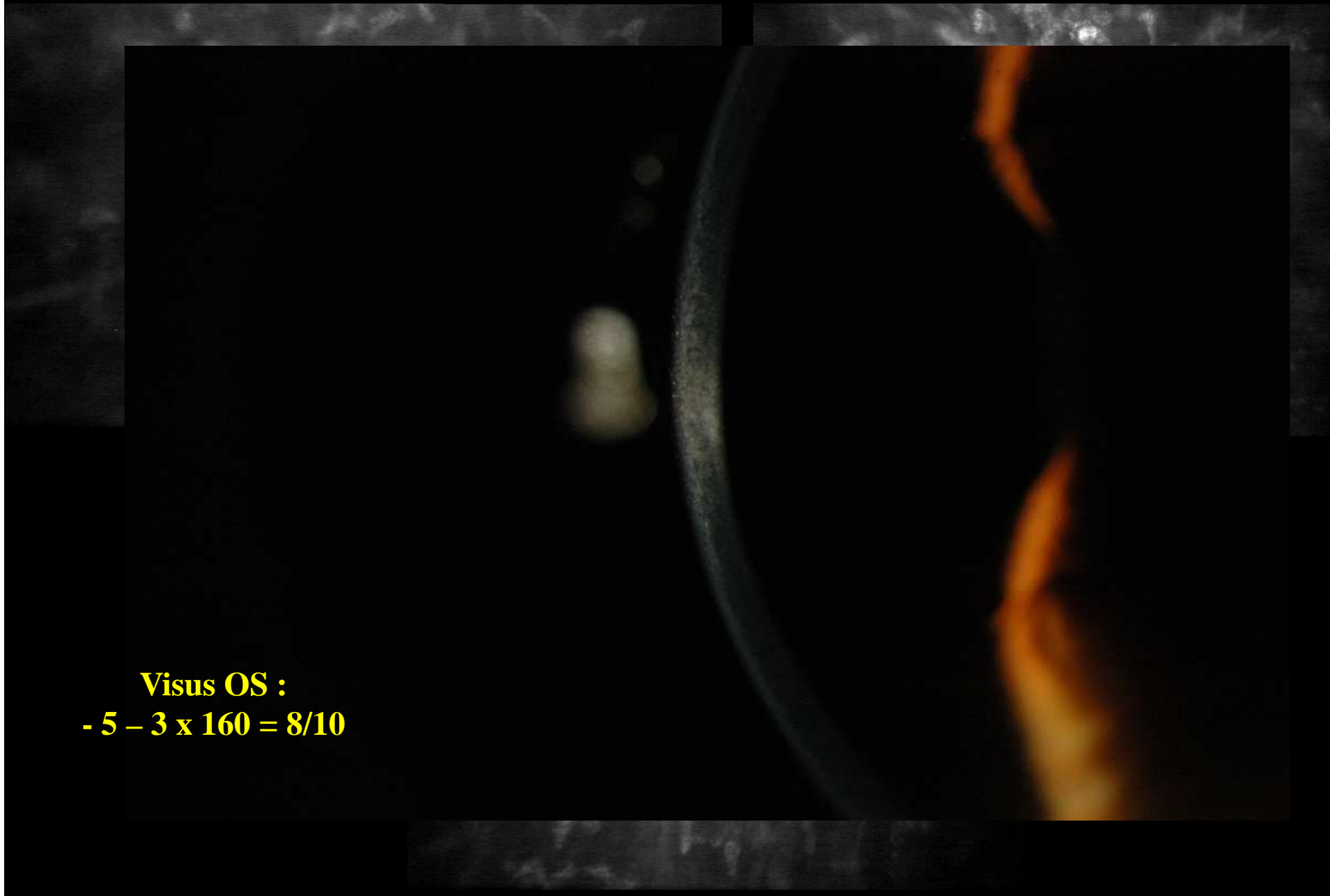
Visus OS : - 5 - 3 x 160 = 6/10

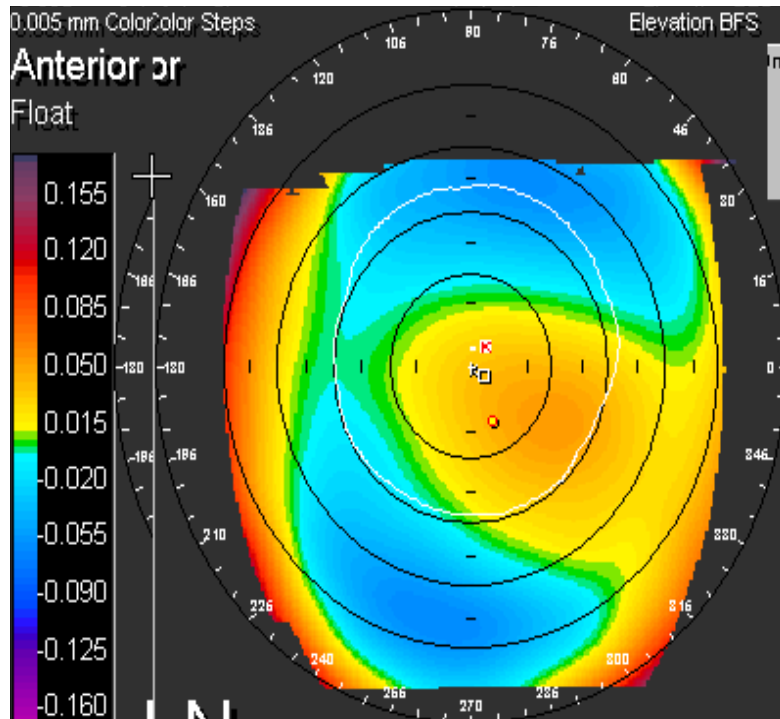
1° GIORNO POST OPERATORIO



6° MESE

Visus OS :
- 5 - 3 x 160 = 8/10





mm/46.9D 5.68mm/59.5D

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Y1285 M1983
7/2011 6:25:43 PM

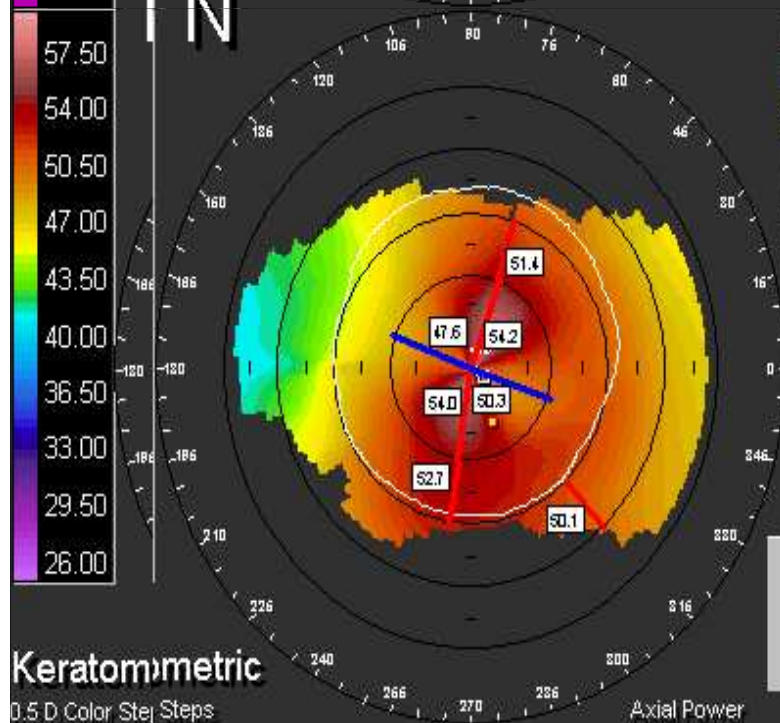
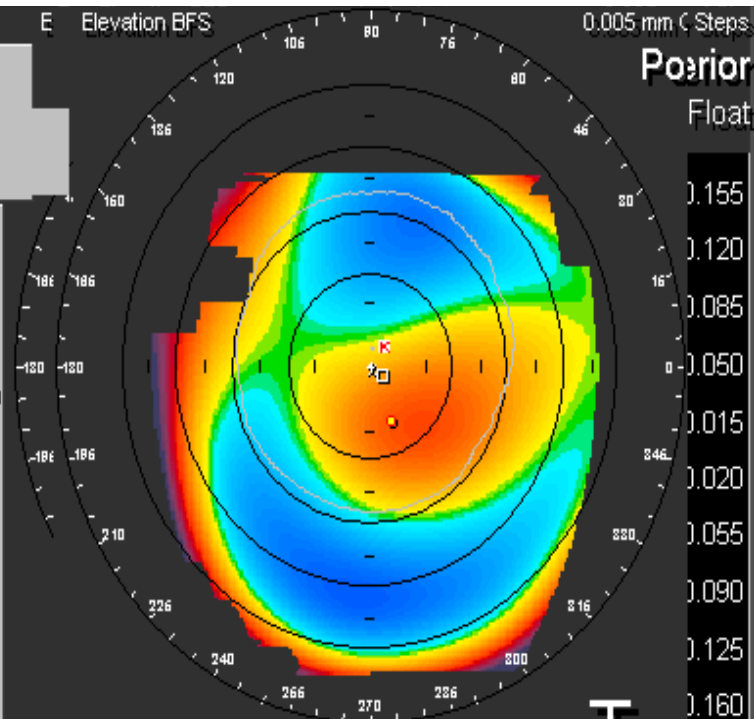
cnica Oculistica Policlinico Catania

n K's: Astig: 6.7 D @ 66 deg
ax: 55.2 D @ 66 deg
t: 48.5 D @ 156 deg

0 MM Zone: Irreg: ± 4.4 D
ean Pwr 50.6 ± 2.9 D
stig Pwr 5.2 ± 3.3 D
eep Axis 67 ± 23 deg
t Axis 162 ± 23 deg

0 MM Zone: Irreg: ± 5.8 D
ean Pwr 48.3 ± 4.2 D
stig Pwr 3.5 ± 4.0 D
eep Axis 77 ± 37 deg
t Axis 161 ± 36 deg

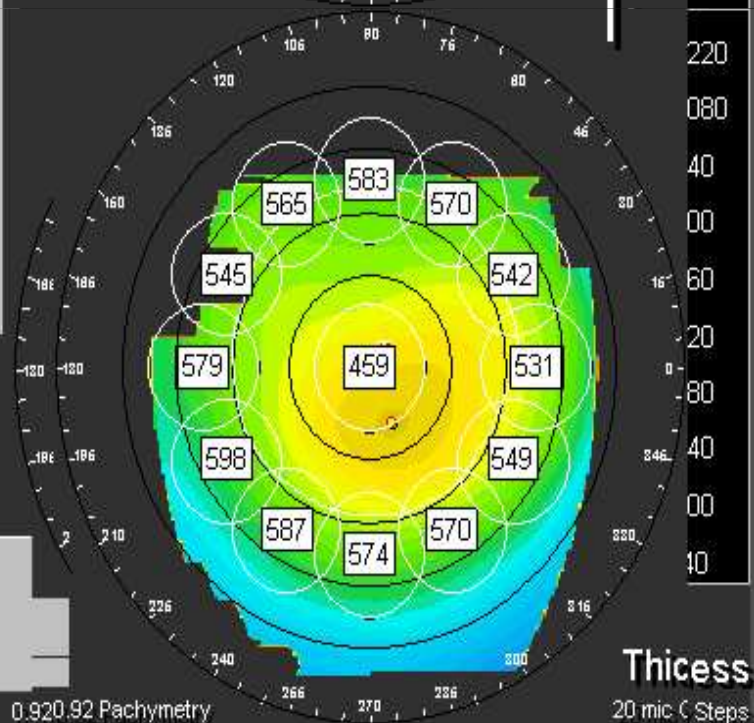
White-to-White [mm]: 12.0
upil Diameter [mm]: 5.2
innest: 428 um @ (0.4, -0.8)
CD (Endo): 3.68 mm
appa: 5.57° @ 351.92°
p Intercept: 0.23, 0.36



OS

ORBSCAN

0.920.92 Pachymetry



CONCLUSIONI

- **Variazioni significative dei parametri clinici dopo CXL (> BCVA, stabilizzazione dei valori topografici)**
- **Scarsa attendibilità della misurazione della IOP con Tonometro di Goldmann nel pre trattamento**
- **Buona affidabilità della misurazione della IOP con O.R.A. (IOPcc) nel pre trattamento**
- **Ripetibilità delle misurazioni delle fibre nervose peripapillari con OCT Spectralis**

POSSIBILITA' FUTURE

- **Stabilire le correlazioni tra IOPcc e i cambiamenti delle RFNL con OCT Spectralis**