

Corneal molding and riboflavin-UVA collagen cross-linking in keratoconus

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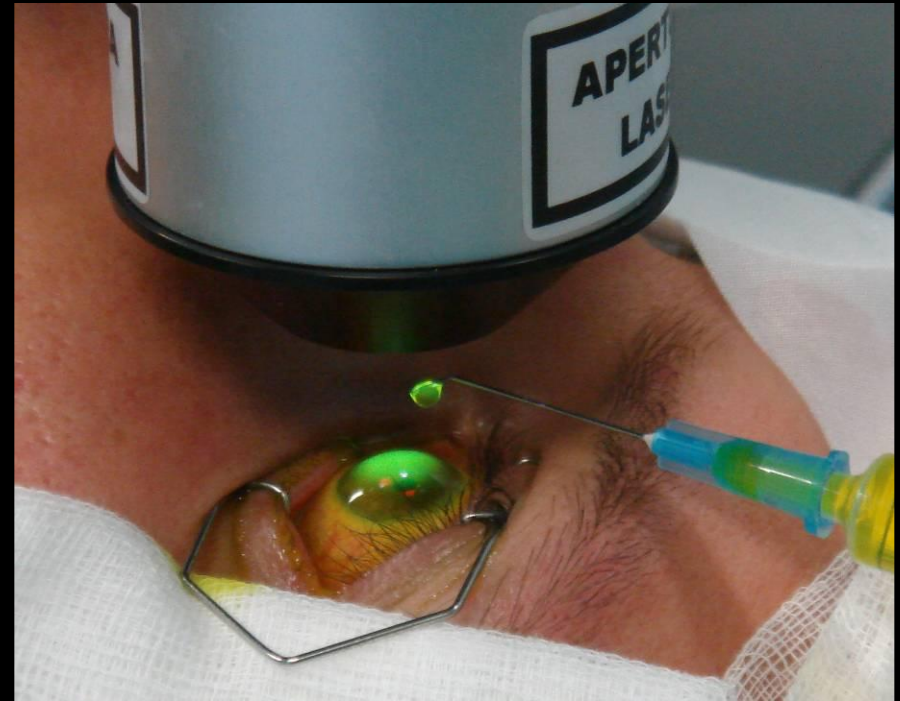
Financial Disclosure: CL patent holder (AC)

A prospective study was designed to answer two questions



- Is it possible to improve the quality of vision of keratoconus patients with overnight orthokeratology?
- Is it possible to stabilize the effect of corneal reshaping through collagen cross-linking?

Procedure

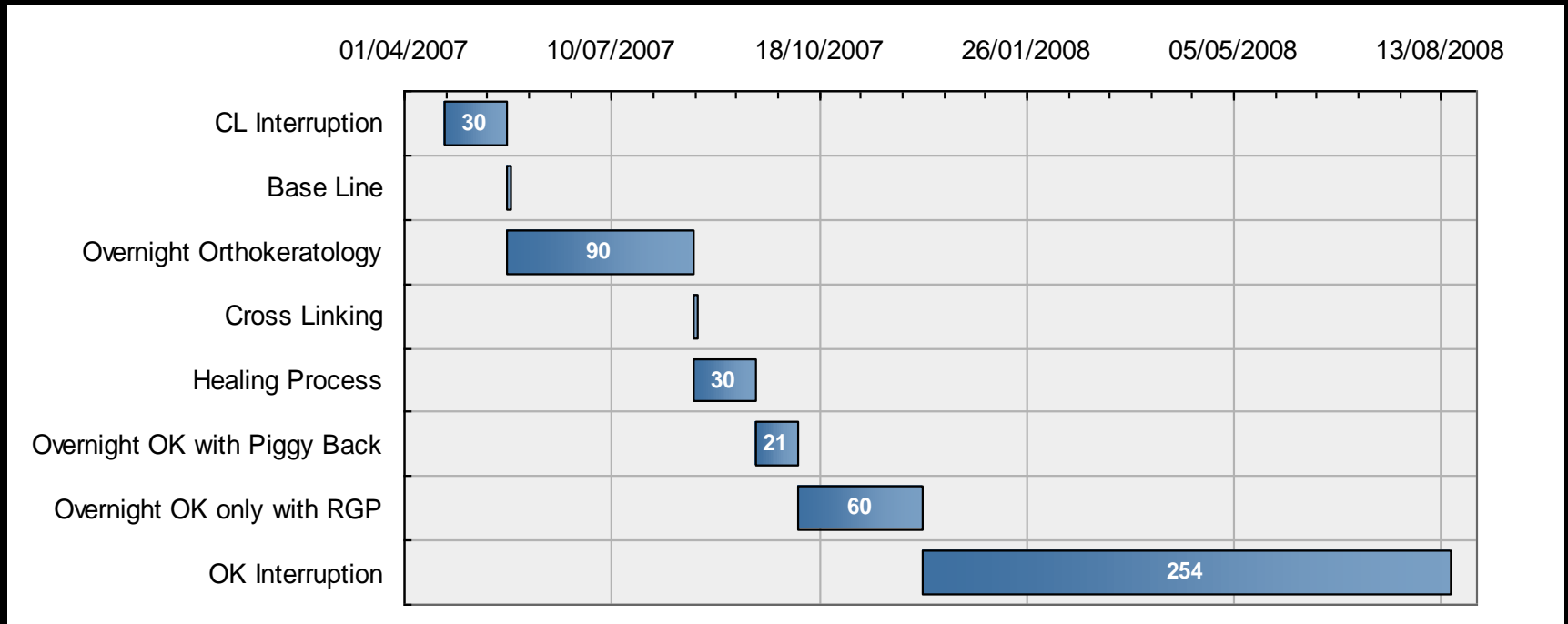


- I developed a molding reverse geometry contact lens, specifically designed to be fitted in keratoconus. The lens was in siloxy-fluoromethacrylate Dk 100 gas-permeable material (Boston XO, hexafocon-A)
- Collagen cross-linking was performed with riboflavin + UVA following the Siena group protocol (Caporossi et al. *J Cataract Refract Surg.* 2006)

Pilot group

- 5 eyes of 4 patients (3 females, 1 male)
- Age from 22 to 43 years
- Diagnosis of keratoconus based on corneal topography and clinical signs
- Suffering from visual symptoms
- Intolerant to conventional CL
- Pachimetry > 400 microns

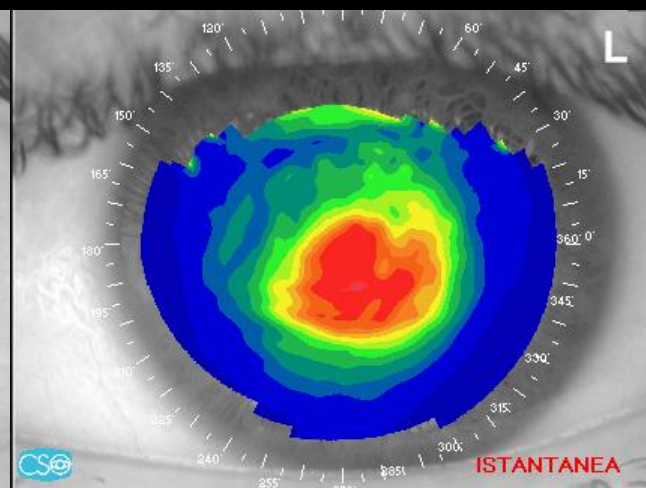
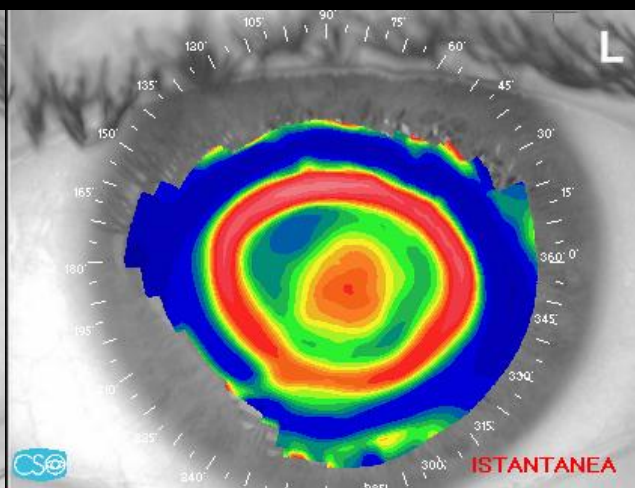
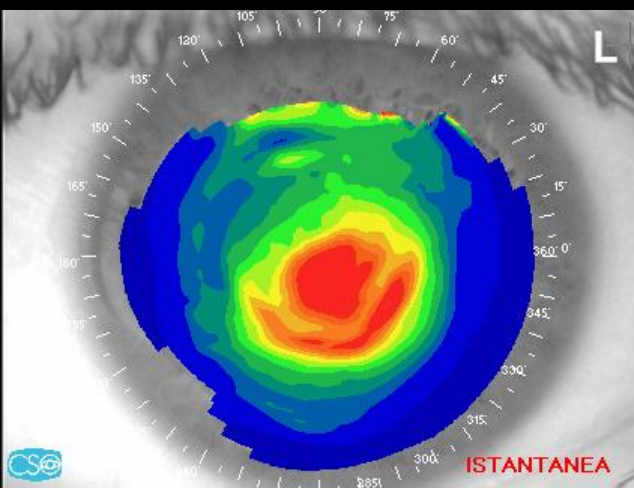
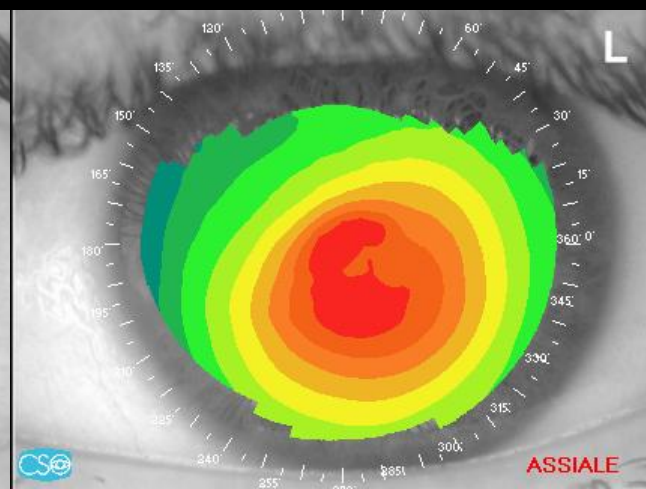
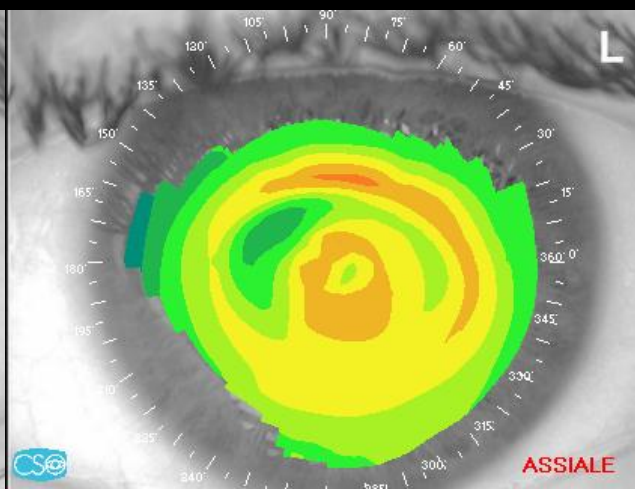
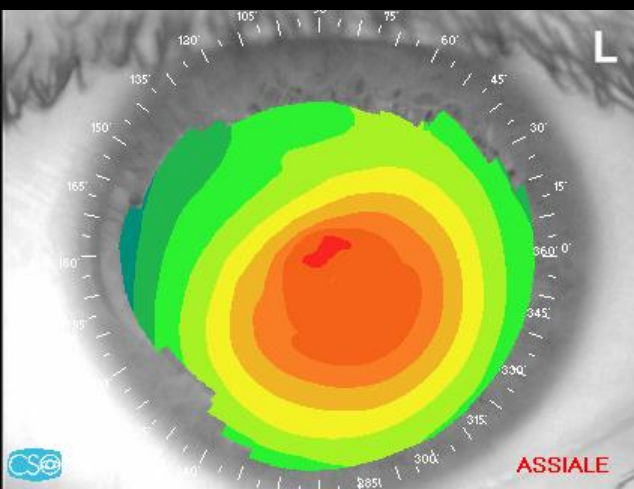
Timeline of the Study



- Patients underwent to overnight orthokeratology (OK) for three months; then collagen cross-linking was performed
- After one month for healing process, overnight orthokeratology was resumed with piggy-back (RGP + silicon-hydrogel CL) for three weeks, and only with RGP lenses for two further months; then the use of any kind of contact lenses was interrupted
- Data were collected at base line, 3 months after OK, four months after cross-linking (one month after OK interruption), and one year after cross-linking

Corneal Topography and Corneal Aberrometry

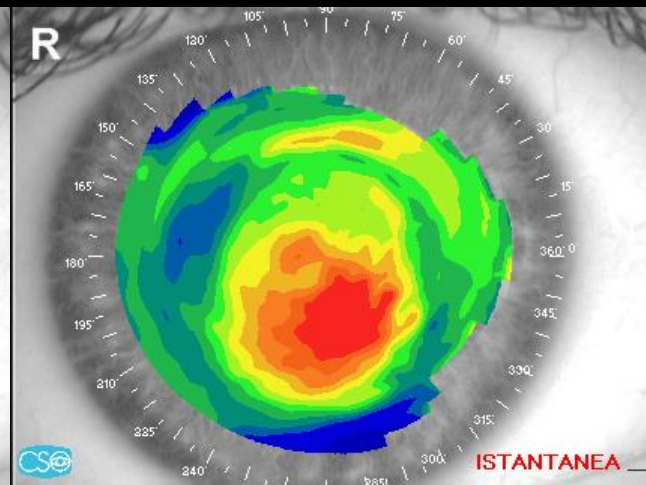
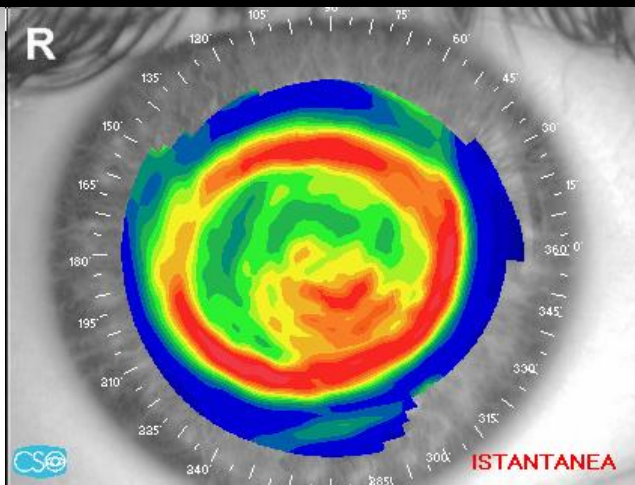
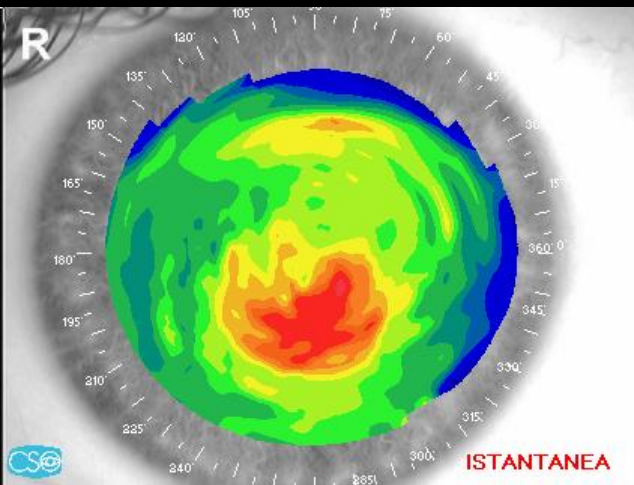
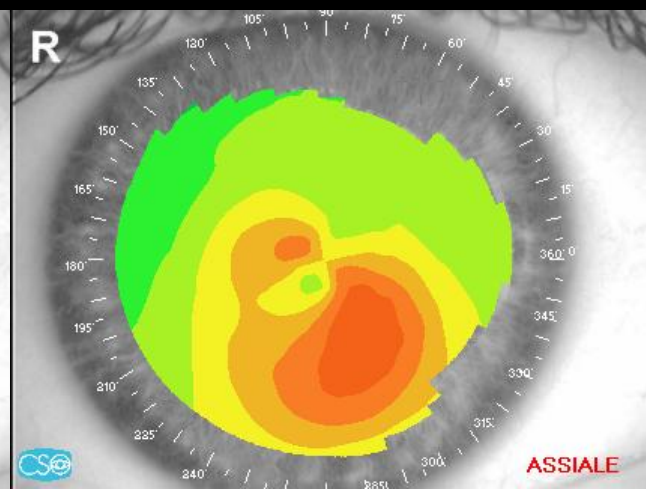
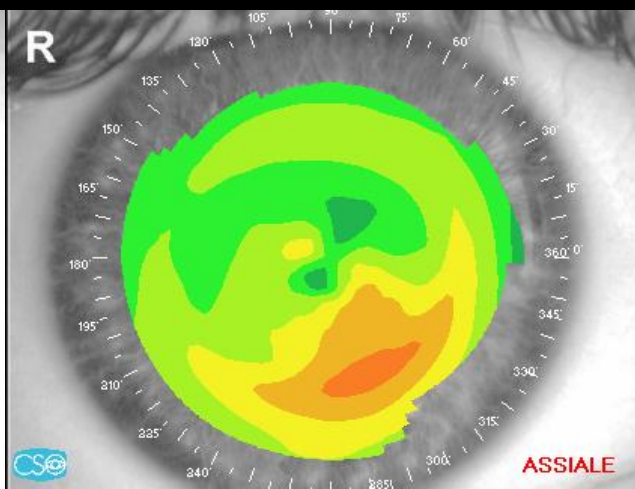
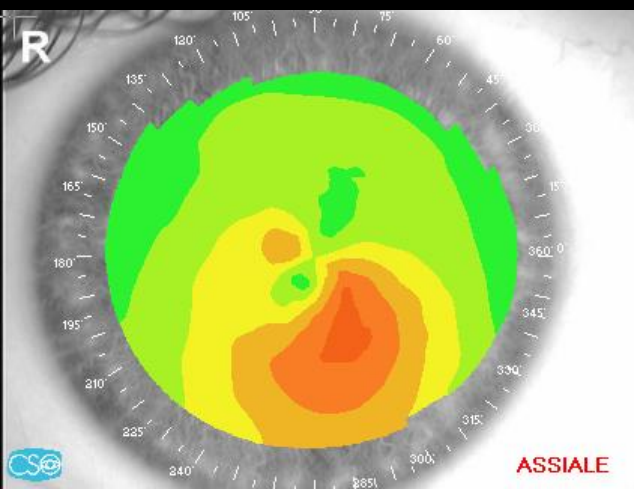
- In all the cases, corneal topography showed an improvement in corneal shape after overnight orthokeratology, with a significant reduction of corneal aberrations
- One month after ortho-k interruption, corneal topography and corneal wave-front error returned at baseline level and remain the same one year after cross-linking



Pre
UCVA 0.05
(20/400)

Post OK
UCVA 0.5
(20/40)

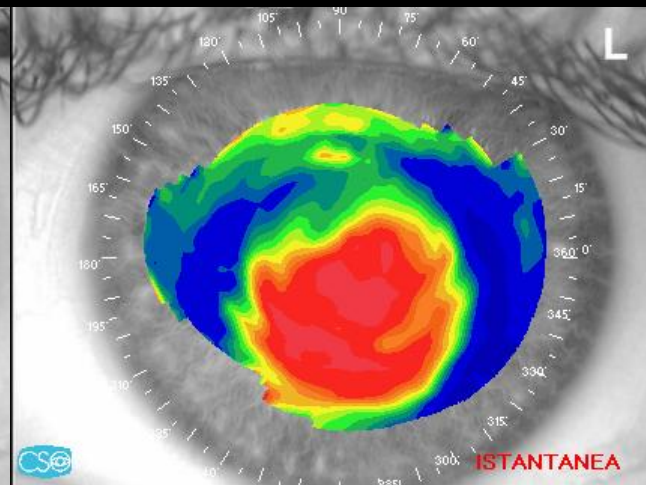
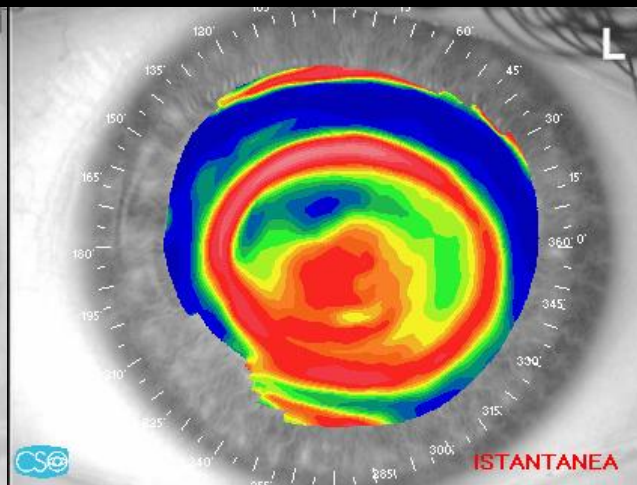
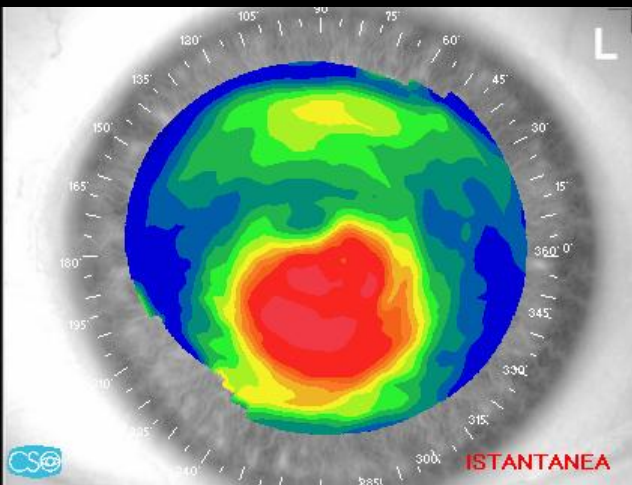
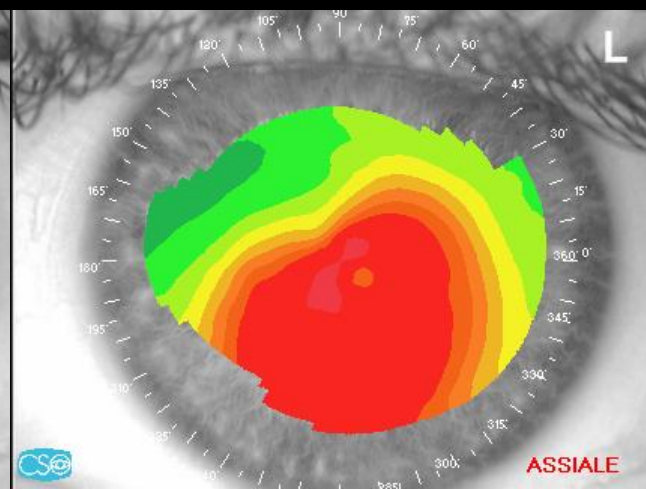
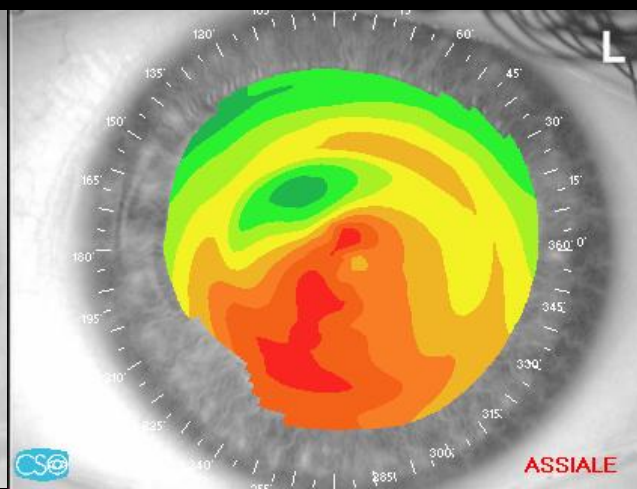
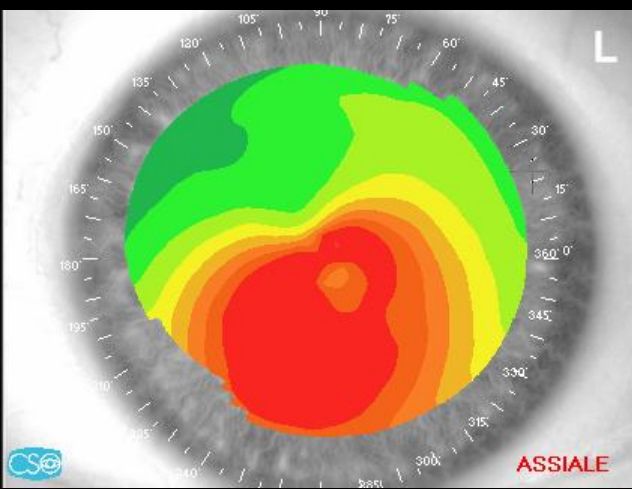
Post CXL
UCVA 0.3
(20/70)



Pre
UCVA 0.4
(20/50)

Post OK
UCVA 0.8
(20/25)

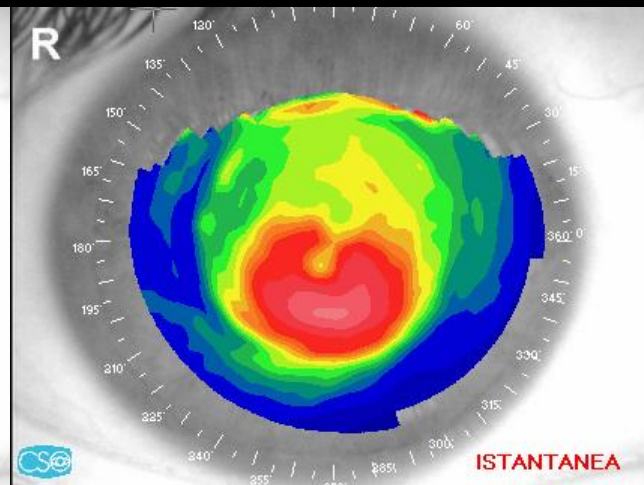
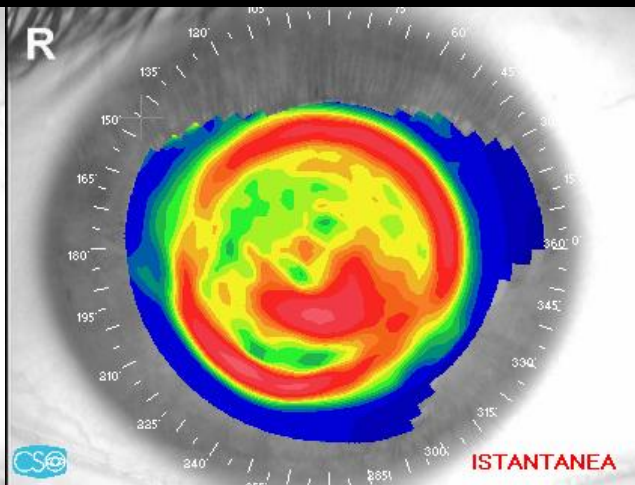
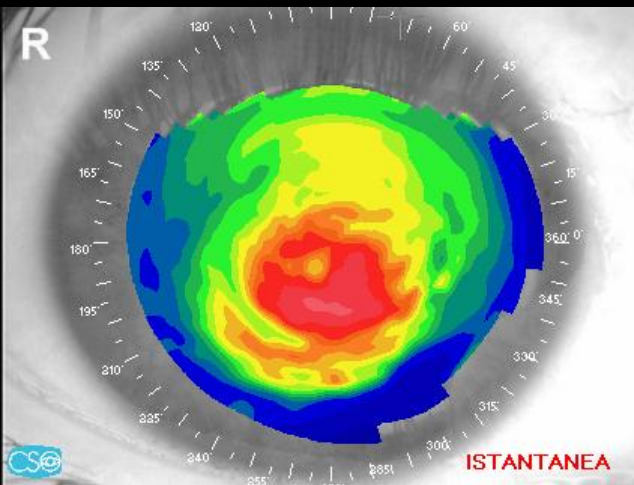
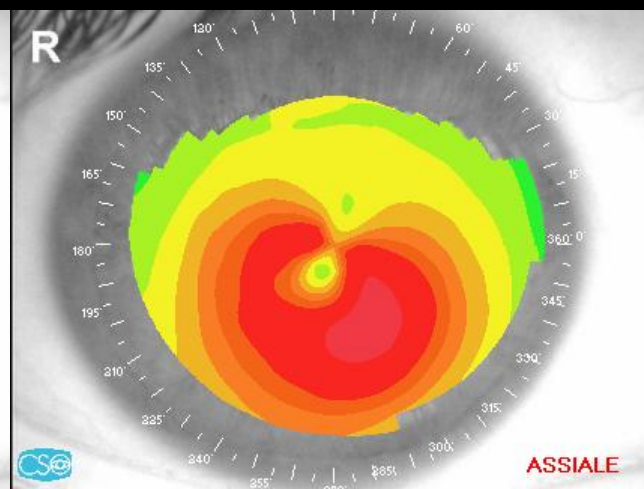
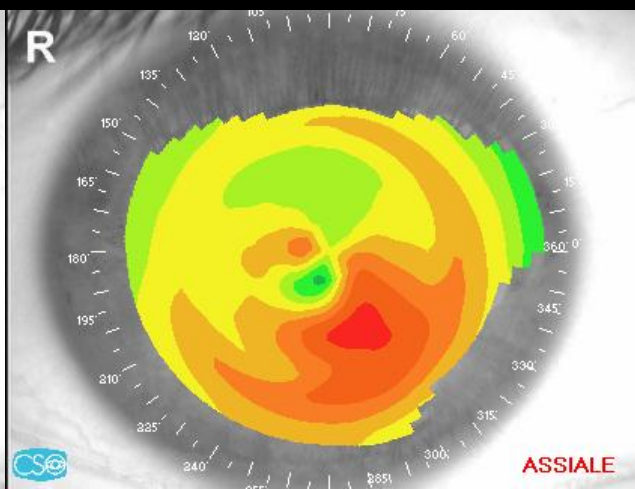
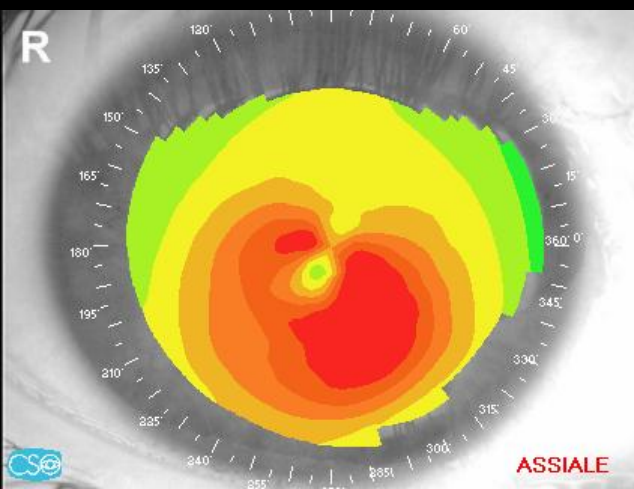
Post CXL
UCVA 0.3
(20/70)



Pre
UCVA 0.03
(20/700)

Post OK
UCVA 0.15
(20/125)

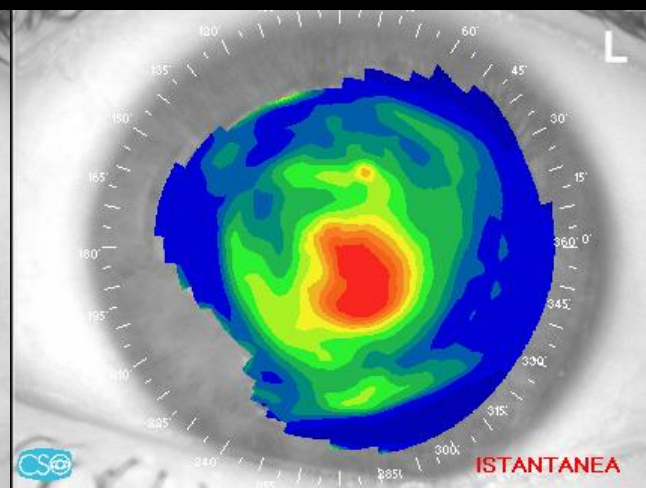
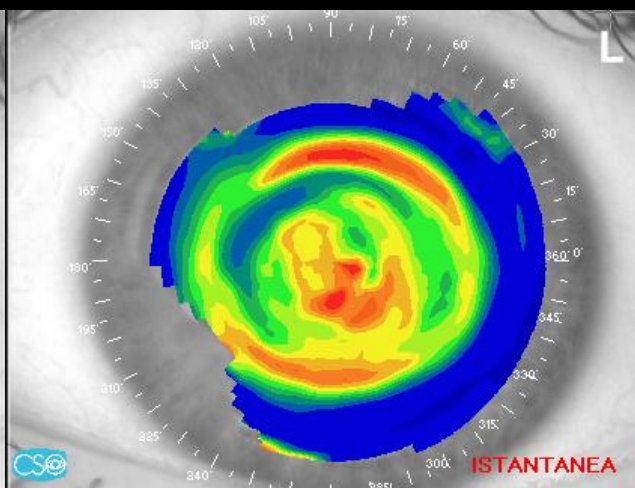
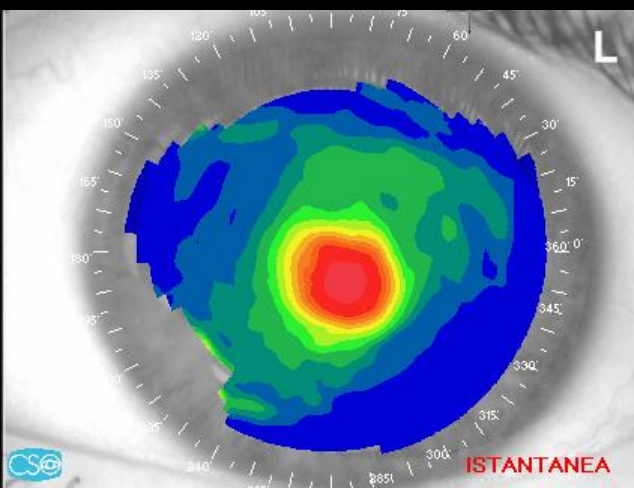
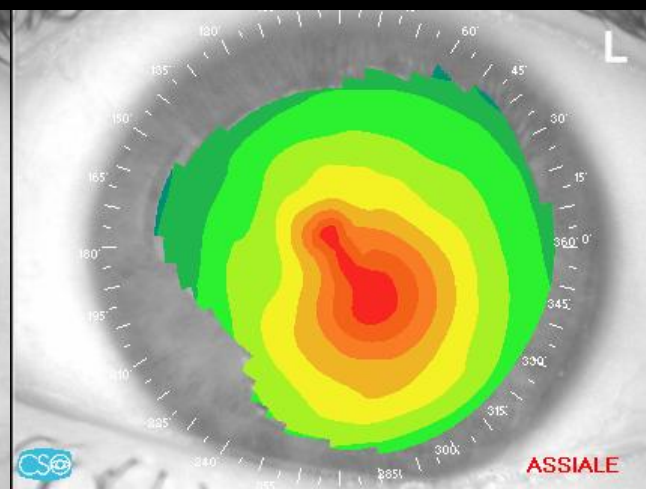
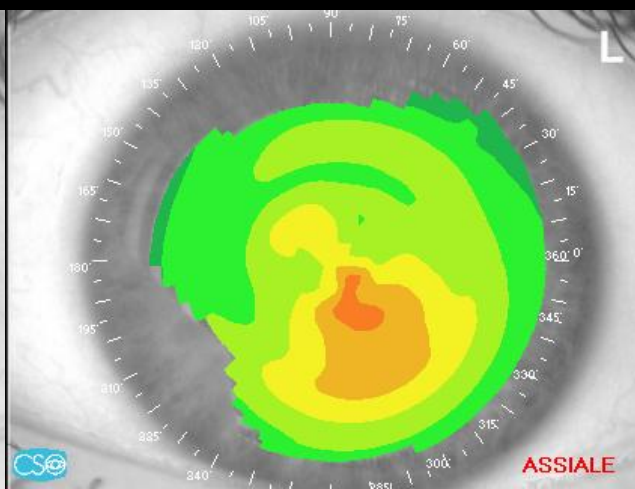
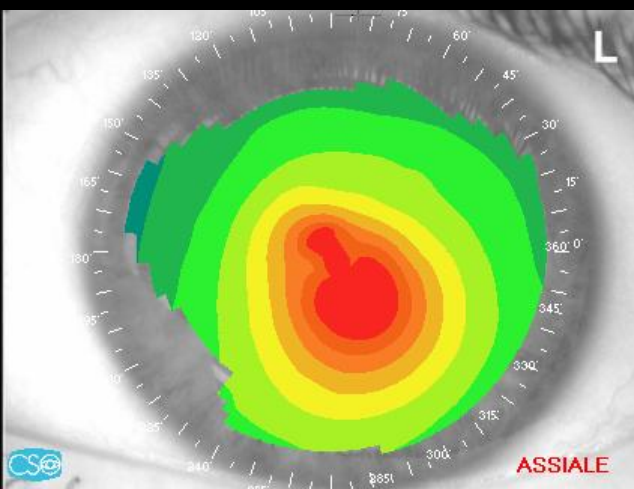
Post CXL
UCVA 0.05
(20/400)



Pre
UCVA 0.05
(20/400)

Post OK
UCVA 0.5
(20/40)

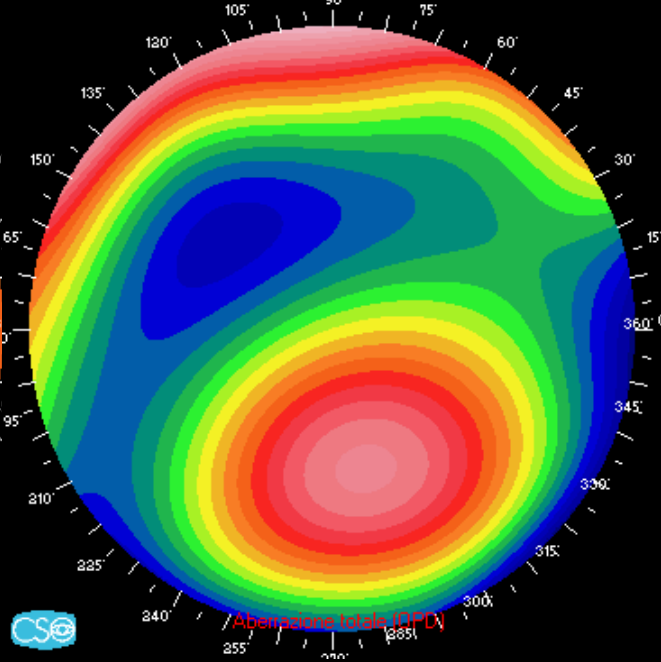
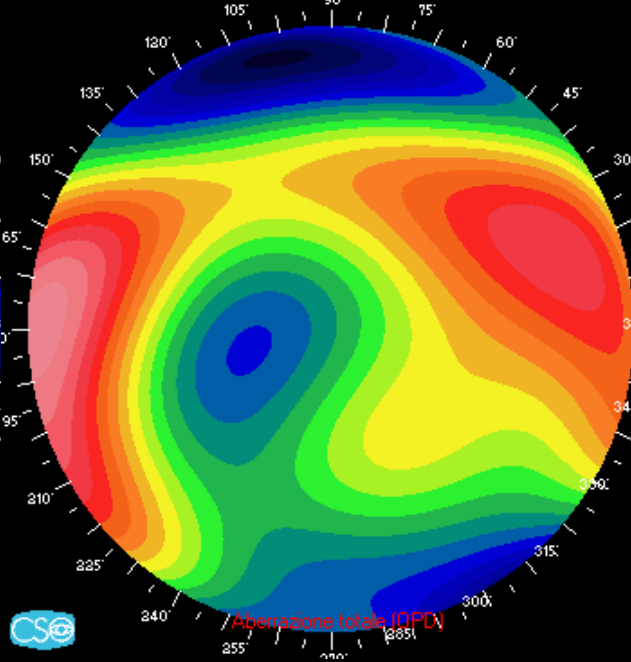
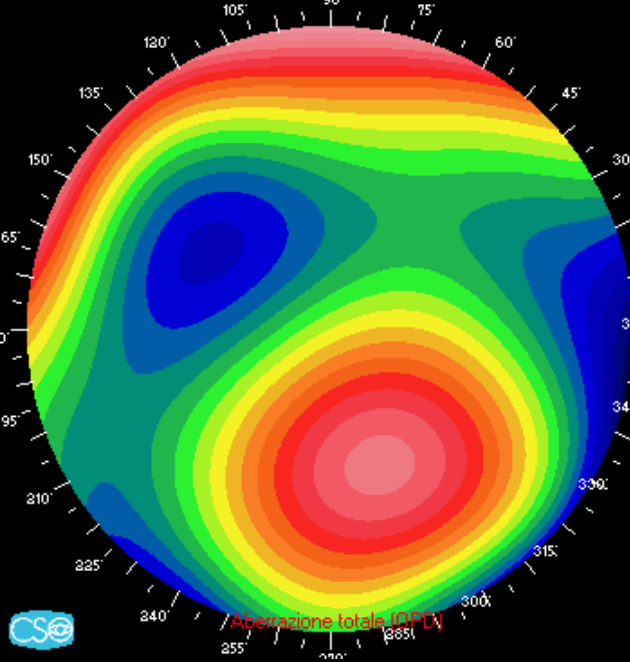
Post CXL
UCVA 0.1
(20/200)



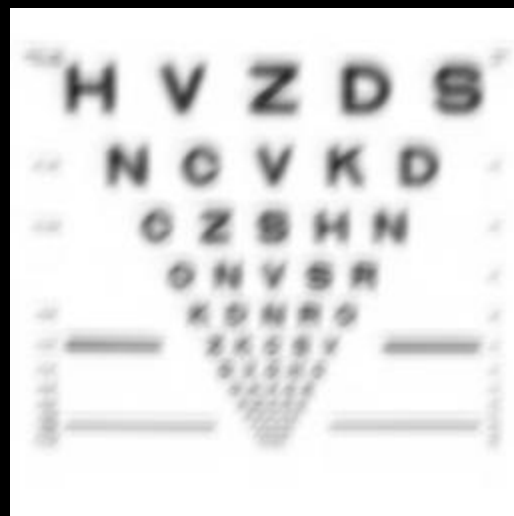
Pre
UCVA 0.1
(20/200)

Post OK
UCVA 0.5
(20/40)

Post CXL
UCVA 0.5
(20/70)



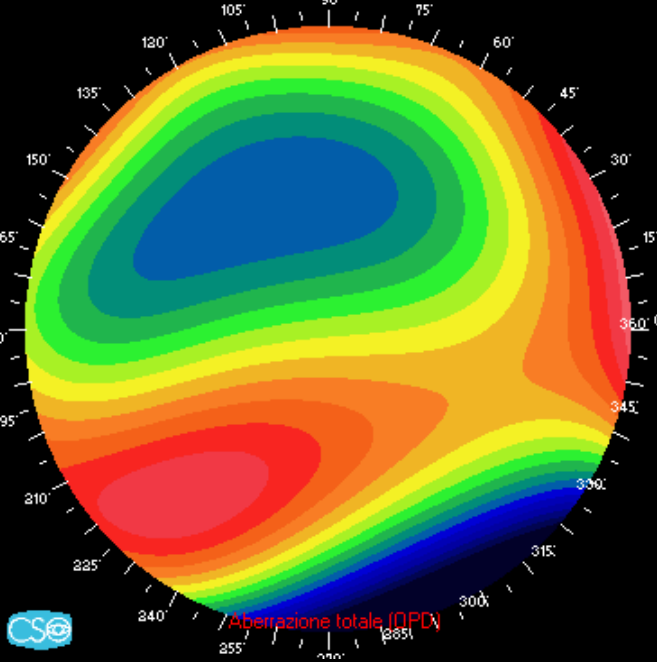
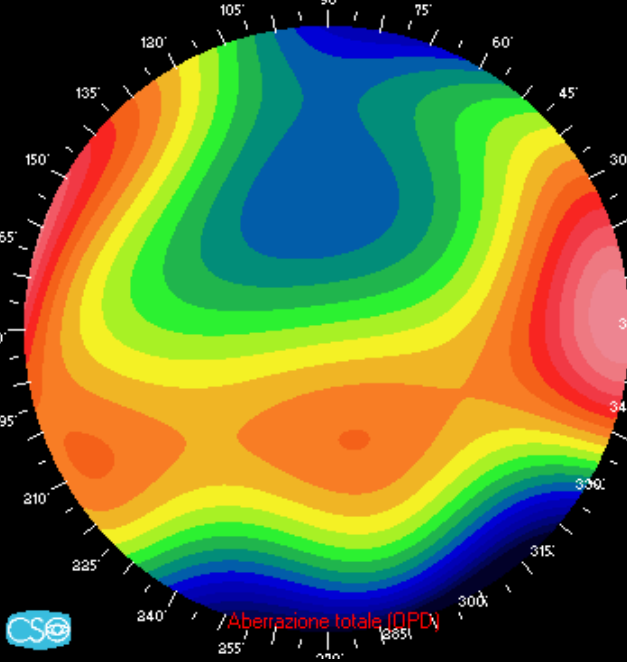
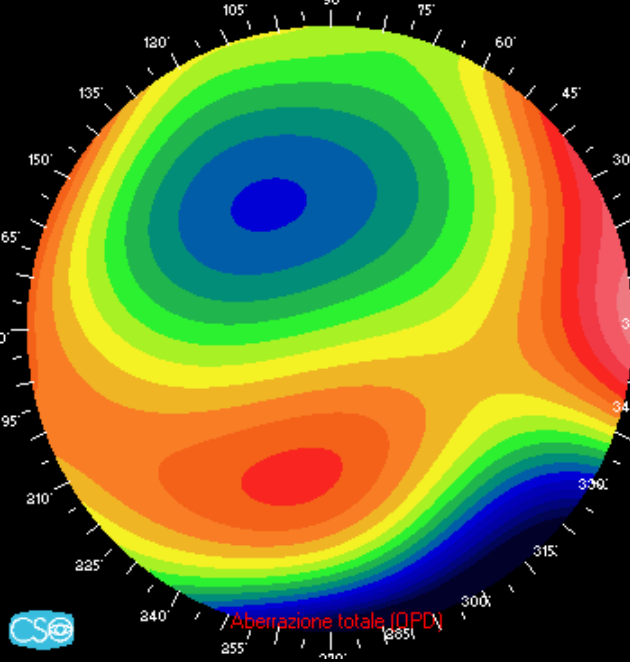
Pre
RMS 1.75 μm
UCVA 0.05



Post OK
RMS 1.64 μm
UCVA 0.5



Post CXL
RMS 1.95 μm
UCVA 0.3



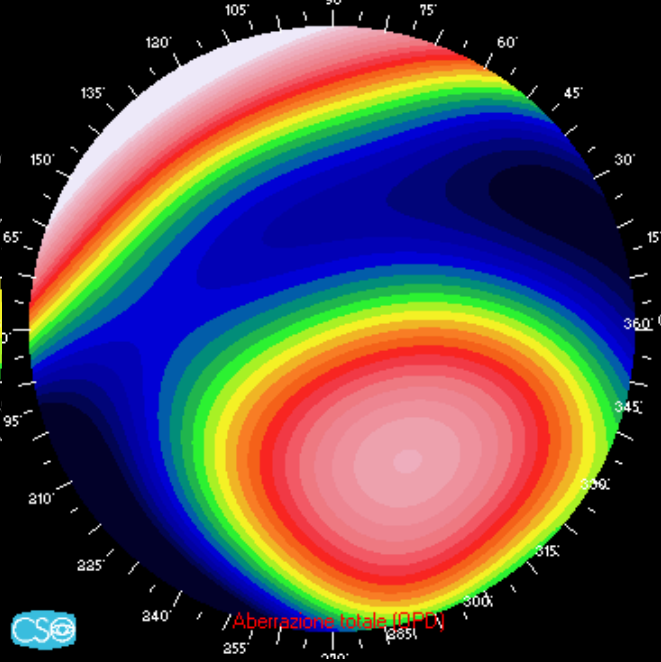
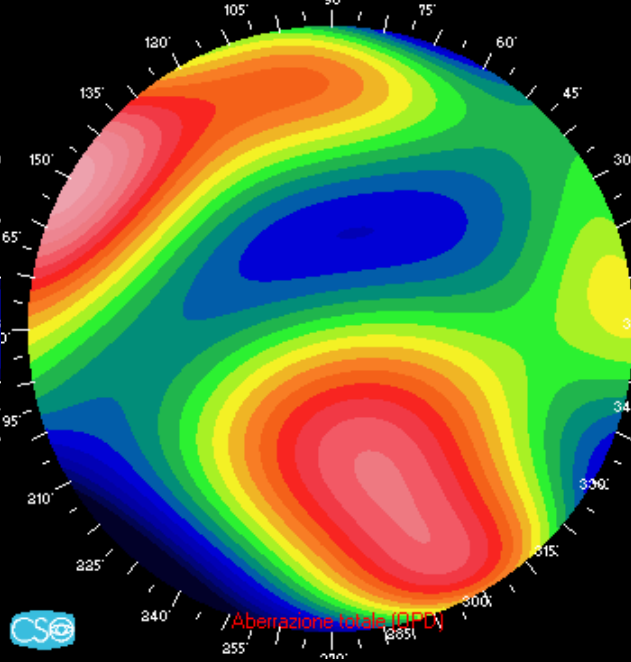
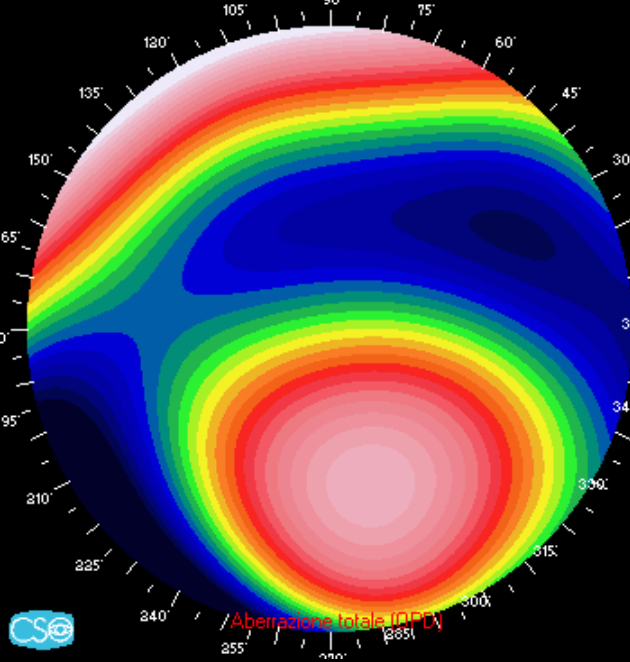
Pre
 RMS 1.51 μm
 UCVA 0.4



Post OK
 RMS 1.51 μm
 UCVA 0.8



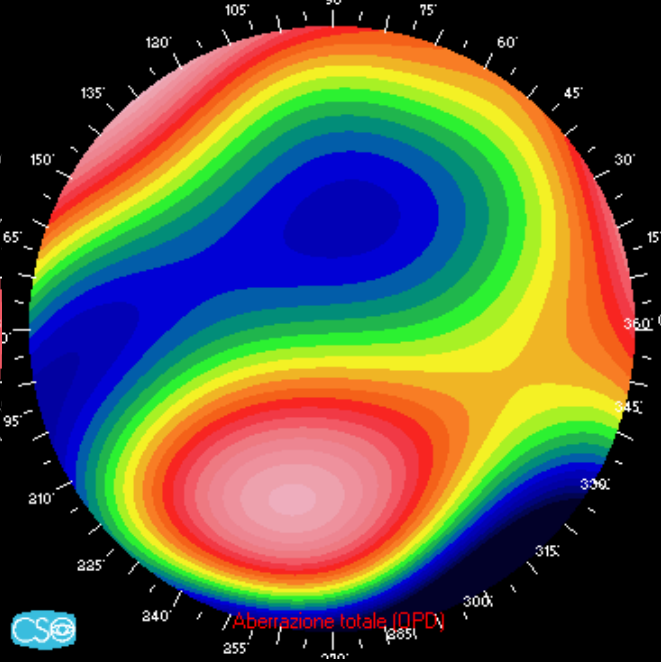
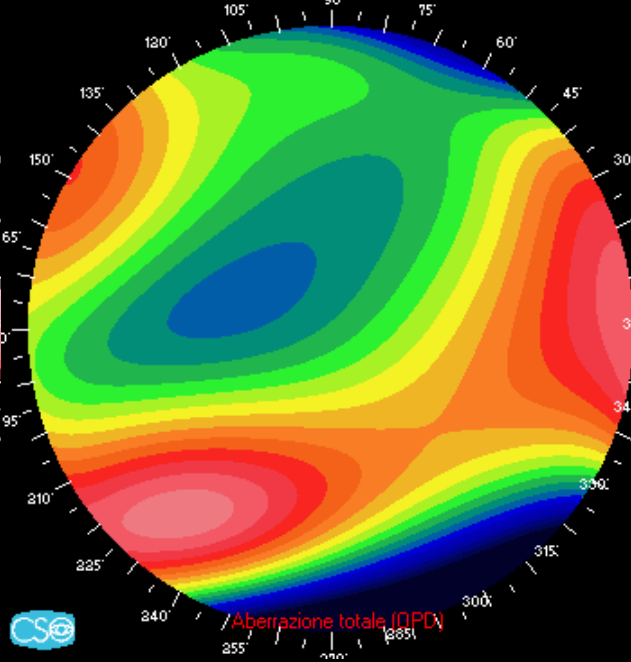
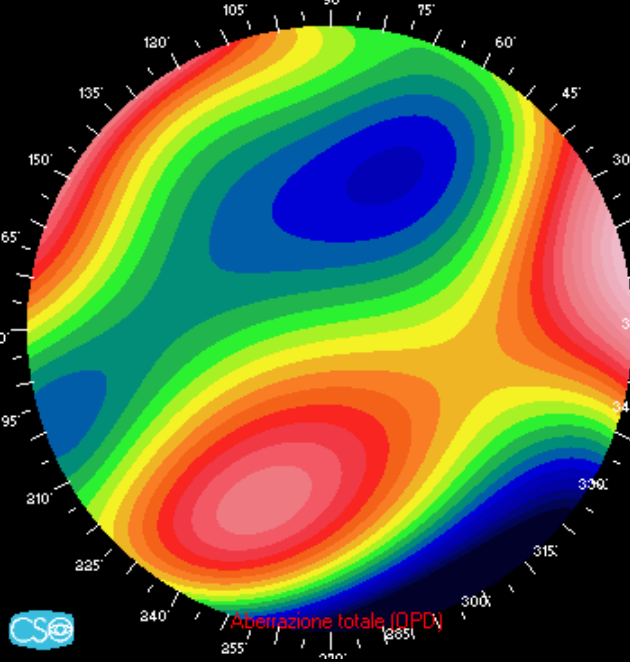
Post CXL
 RMS 1.63 μm
 UCVA 0.3



Pre
RMS 3.04 μm
UCVA 0.03

Post OK
RMS 1.92 μm
UCVA 0.15

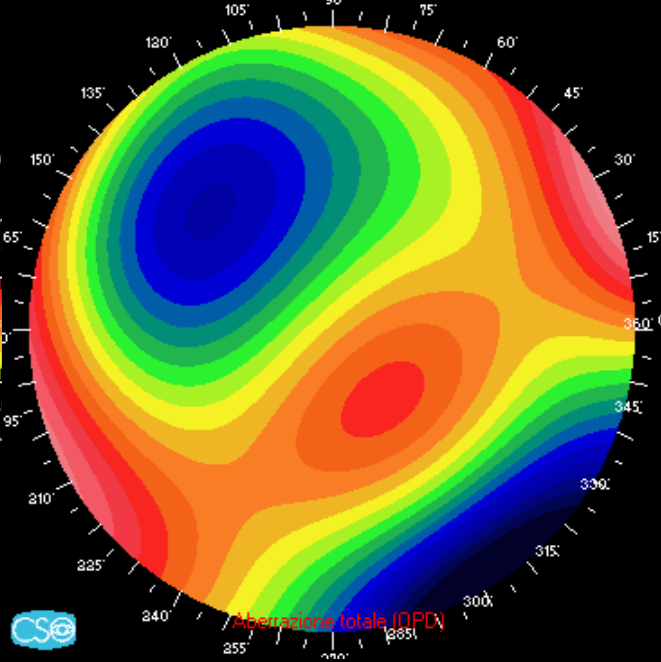
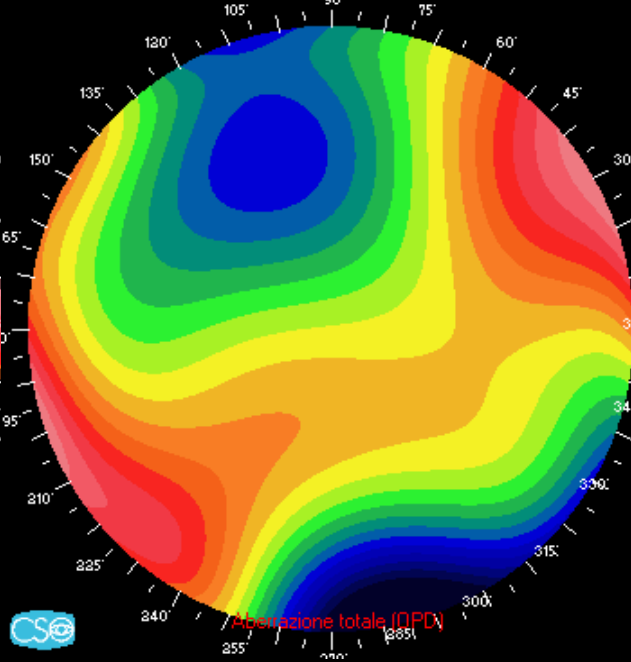
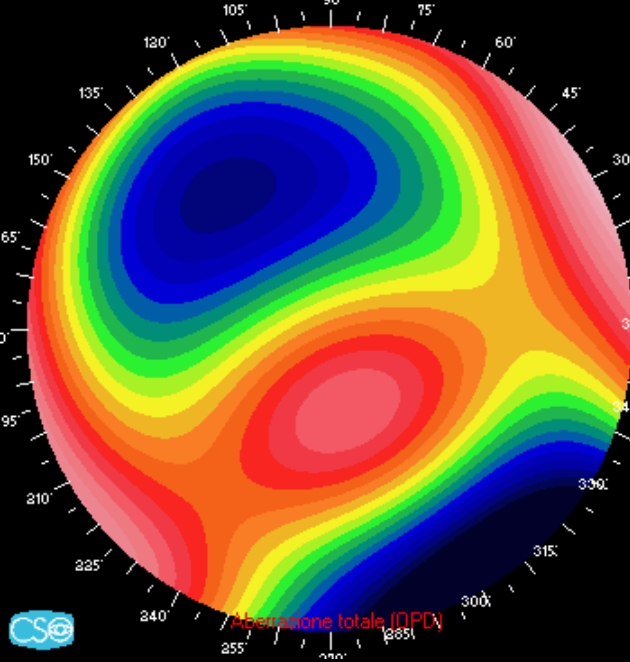
Post CXL
RMS 3.11 μm
UCVA 0.05



Pre
RMS 1.99 μm
UCVA 0.05

Post OK
RMS 1.75 μm
UCVA 0.5

Post CXL
RMS 2.33 μm
UCVA 0.1



Pre
RMS 2.35 μm
UCVA 0.1

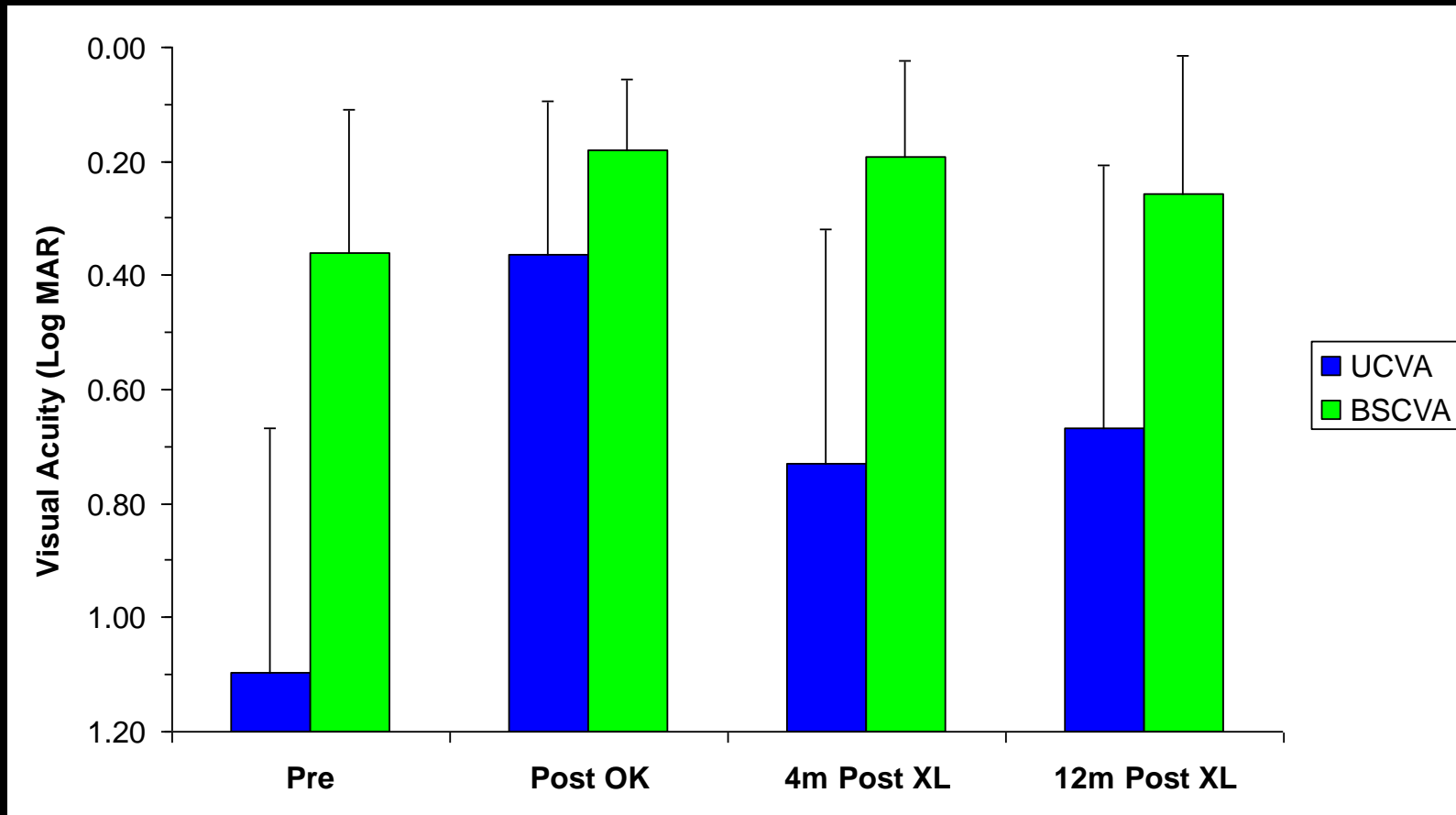


Post OK
RMS 1.50 μm
UCVA 0.5



Post CXL
RMS 1.74 μm
UCVA 0.5

Visual Acuity

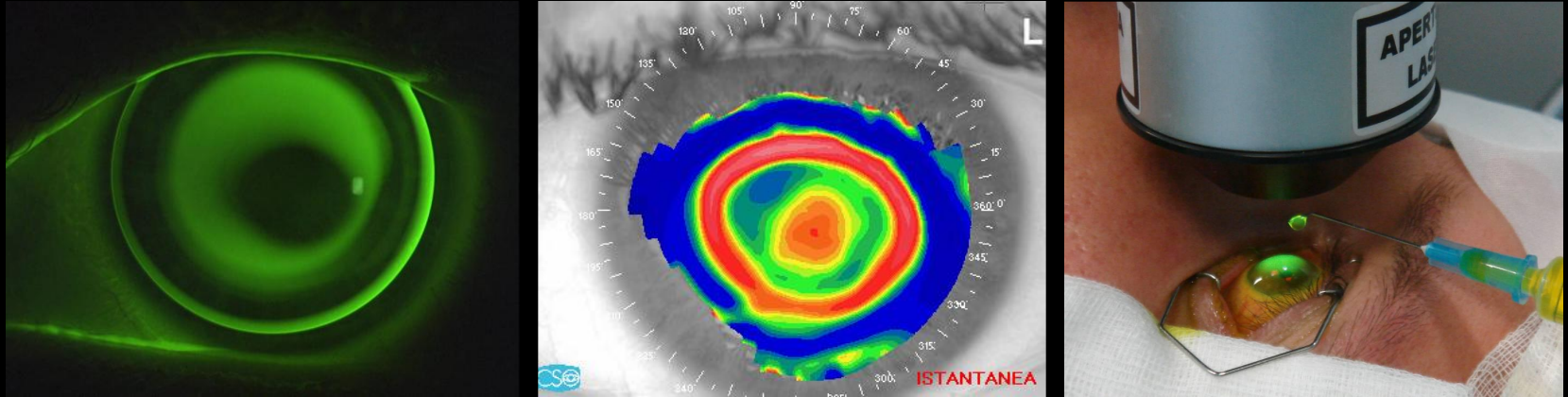


UCVA and BSCVA improved after orthokeratology; this improvement was reduced one month after ortho-k CL interruption, but did not return to baseline level

Complications

- No adverse reactions were observed during the three months of OK
- One eye showed an epithelial defect with asymptomatic iritis reaction after cross-linking. This complication resolved after one month following corticosteroid therapy, and the OK treatment was continued
- No relevant signs were observed 4 months after cross-linking and after one year

Conclusions



- Overnight orthokeratology may reshape the keratoconic cornea without significant adverse reactions
- Riboflavin-UVA corneal collagen cross-linking is quite safe, but it is not able to stabilize the OK molding effect
- Nevertheless, UCVA and BSCVA did not go back to the baseline level
- At the present time, we are not able to explain this discrepancy



**Grazie per
l'attenzione**

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