

Epithelial Remodeling Following Femtosecond-assisted High Myopic LASIK: Comparison of Stand-alone to LASIK Combined with Prophylactic High-Fluence Cross-linking



George Asimellis, PhD², A. John Kanellopoulos, MD^{1,2}

¹: New York University Medical School, NY, NY, USA ²: LaserVision.gr Eye Institute, Athens, Greece



PURPOSE

To evaluate topographic epithelial profile thickness changes following high -myopic femtosecond-LASIK with prophylactic high-fluence cross-linking (LASIK Xtra) compared to standard LASIK.

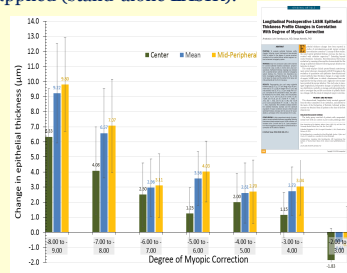
METHODS

- Pre-operative and 12-month post-operative 3-dimensional epithelial thickness distribution maps were investigated via a clinical spectral-domain anterior-segment OCT in two groups of femto-second laser-assisted myopic LASIK cases.
- Group-A: 67 eyes treated additionally with concurrent prophylactic CXL (LASIK-Xtra);
- Group-B: 72 eyes, stand-alone femtosecond LASIK.

BACKGROUND

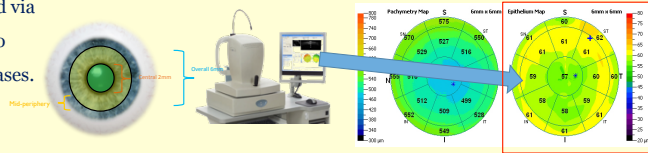
In previous work we demonstrated a correlation of epithelial thickness increase with Myopia Correction SE:

Central, overall, and mid-peripheral ring of epithelial thickness distribution according to the amount of myopia corrected shows a clear trend towards a significant thicker epithelial changes with increasing myopia (over 6D) when no CXL is applied (stand-alone LASIK).



MEASUREMENTS

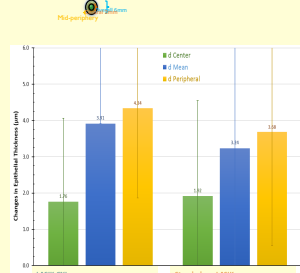
- OCT epithelial thickness measurements investigated:
 - over the center 2-mm diameter disk,
 - mid-peripheral 5-mm rim and
 - overall (entire 6-mm diameter disc area).
- All data provided automatically by the OCT report.



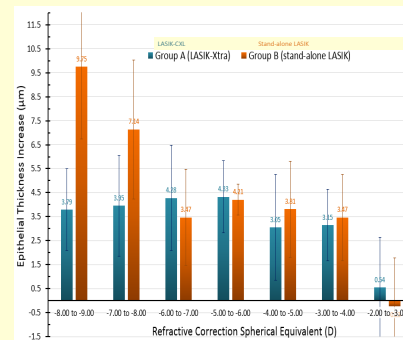
RESULTS

- The comparison of matched myopic correction subgroups indicated statistically significant differences in epithelial thickness increase specifically between high-myopia sub-groups.
- In group-A (LASIK-CXL) the mid-peripheral epithelial thickness increase was +3.79µm and +3.95µm for the (-8.00D to -9.00D) and (-7.00D to -8.00D) subgroups,
- which compare to increased thickness in group-B (stand-alone LASIK), of +9.75µm (p = 0.032) and +7.14µm (p = 0.041), respectively, for the same subgroups.

LASIK CXL vs Stand-alone LASIK epithelial thickness changes:



Matched-myopia subgroups comparison



DISCUSSION

In this study we investigated corneal epithelial thickness 12-month post-operative changes in 169 LASIK cases with a clinically-available AS-OCT system, using raw data obtained from the system report and analysis software, and as such it presents a novel comparative benchmark study.

The two groups in the study were by all other means matched: ablation zone, flap thickness, surgeon, lasers employed and post-operative treatment.

The data in this work support that high myopic cases with stand-alone LASIK treatments (group-B) demonstrate significant epithelial hyperplasia, in the vicinity of +8 to +9 µm. Comparison to group-A (LASIK-CXL) indicates that this hyperplasia in the high-myopic cases appears to be moderate, in the vicinity of +3 to +4 µm, almost similar to the levels encountered in the lower myopic corrections. We therefore believe that this epithelial 'stability' may be an indication of overall corneal biomechanical strengthening as a result of the preventive CXL application.

In addition, the post-operative evaluation of the cases in this group-A has not indicated any clinical or topographic evidence of complications in comparison to the 'stand-alone' (group-B) cases. Visual rehabilitation between the two groups, as expressed by CDVA and contrast sensitivity evaluation, was determined in similar levels in comparison to the stand-alone LASIK procedure, without inducing any side effects or compromising visual safety.

CONCLUSIONS

- Application of prophylactic cross-linking concurrently with high-myopic LASIK operation results in epithelial thickening changes significantly less prominent compared to stand-alone LASIK-CXL.
- This comparison is observed between matched high-myopic correction subgroups.
- This difference may correlate with higher regression rates and/or may depict increased biomechanical instability in the stand-alone LASIK.

