

Three dimensional Epithelial Evaluation following myopic LASIK



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Purpose

- To evaluate epithelial thickness profile changes following myopic femtosecond-assisted LASIK
 - in relation to the degree of myopia corrected,
 - evaluated with a spectral-domain anterior-segment optical coherence tomography system.

Kanellopoulos AJ, Asimellis G, *Longitudinal Post-LASIK Epithelial Thickness Profile Changes, in Correlation with Degree of Myopia Correction. J Refract Surg.* 2014 (forthcoming)



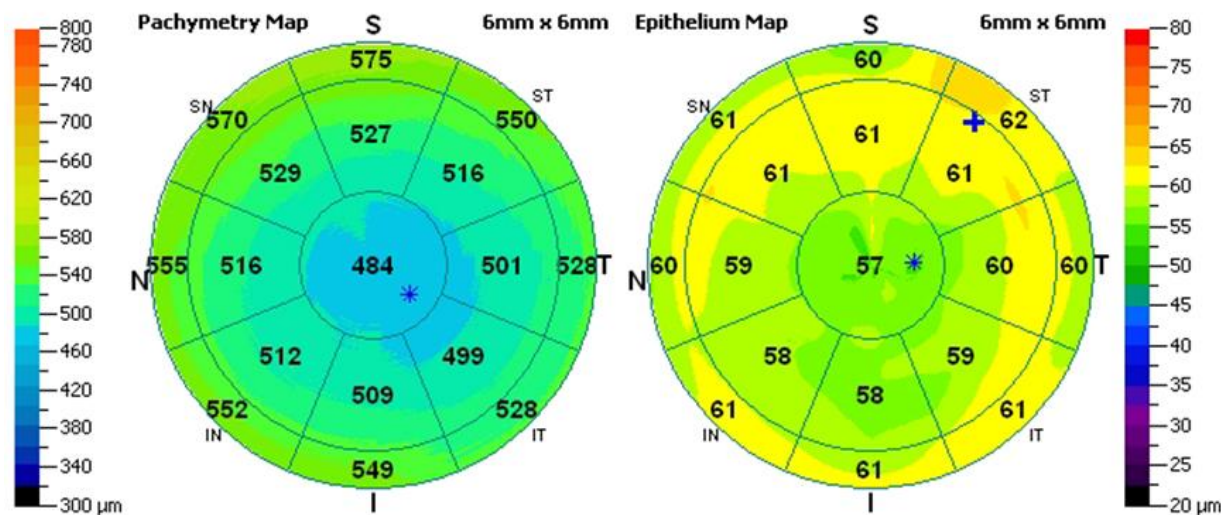
Methods

- 61 consecutive cases that were subjected to femtosecond LASIK myopic correction were investigated for corneal epithelial thickness distribution both pre-operatively as well as one-day, one-week, one-month and one-year post-operatively.
- Epithelial thickness mapping over the 6 mm diameter corneal area was obtained with a commercially-available anterior-segment, spectral-domain optical coherence tomography (AS-OCT) system.
- Descriptive statistics investigated pre- and post-operative epithelial thickness up to one year at the central 2 mm, the average over the central 6 mm area, and mid-peripherally at the 5 mm ring area.



Epithelial thickness 3-D mapping following LASIK

- Corneal and epithelial three-dimensional pachymetry maps over the 6 mm.
- The symbol * indicates thickness minimum (both corneal and epithelial maps), and the symbol + thickness maximum (epithelial map only).



- The specific patient (left eye) received treatment for -4.75 D of sphere and -0.75 D of astigmatism, and was imaged one month postoperatively.

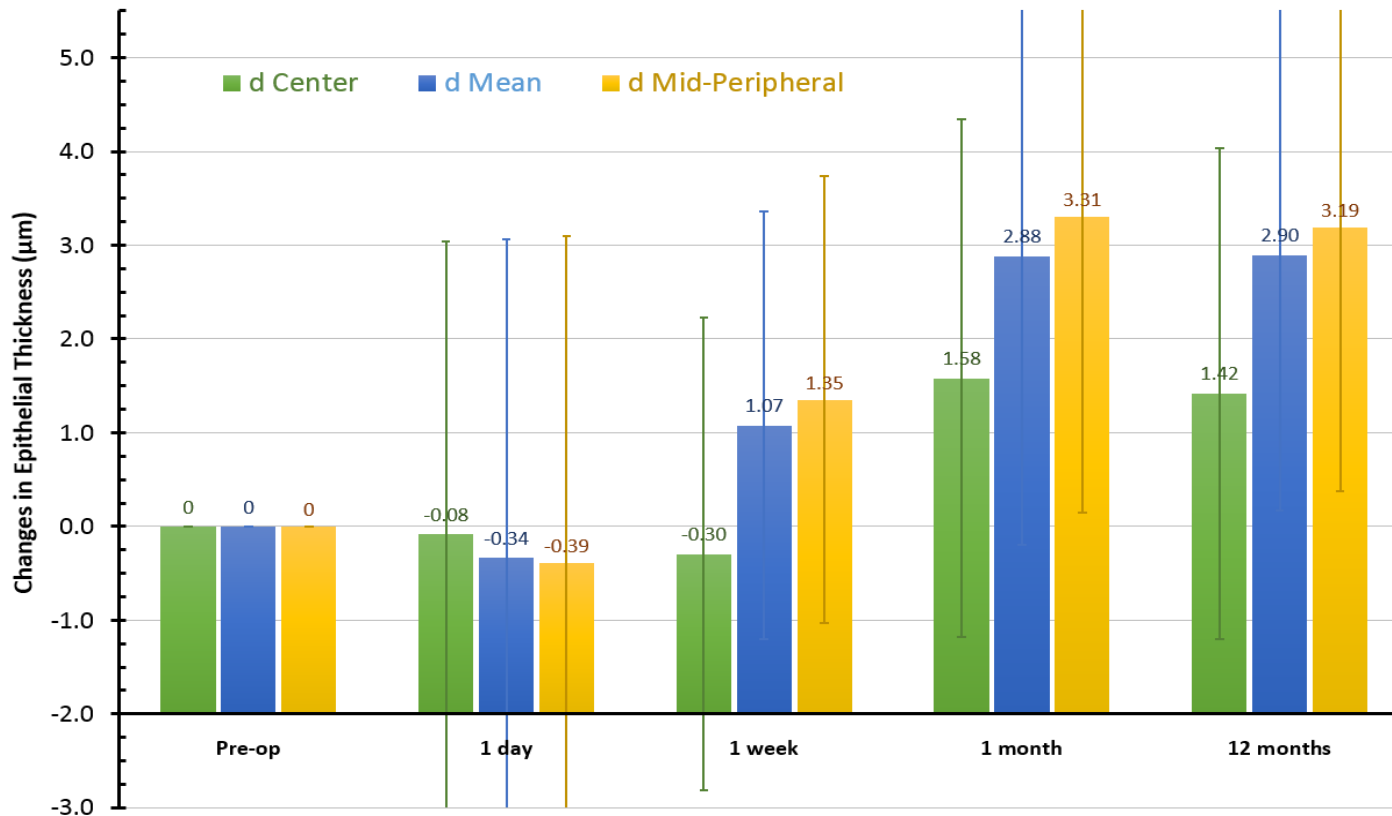
Results

- Preoperatively, pupil center epithelial thickness was 51.67 ± 2.57 (45 to 56) μm , mean 51.76 ± 2.66 (45 to 57) μm , mid-peripheral 51.78 ± 2.71 (46 to 57) μm .
- Epithelial thickness changed at the first postoperative day by -0.08 , -0.34 , and -0.39 μm , centrally, mean, mid-peripherally, then by -0.30 , $+1.07$, $+1.35$ μm on the first week.
- On the first month appeared increased by $+1.58$, $+2.88$, and $+3.31$ μm ($p=0.0036$, <0.001 , and <0.001), and after one-year $+1.42$, $+2.90$, and $+3.19$ μm , ($p=0.146$, <0.001 , and <0.001).
- The correlation between epithelial increase at one-year and the amount of myopic correction showed a trend towards epithelial increase with myopic ablation.



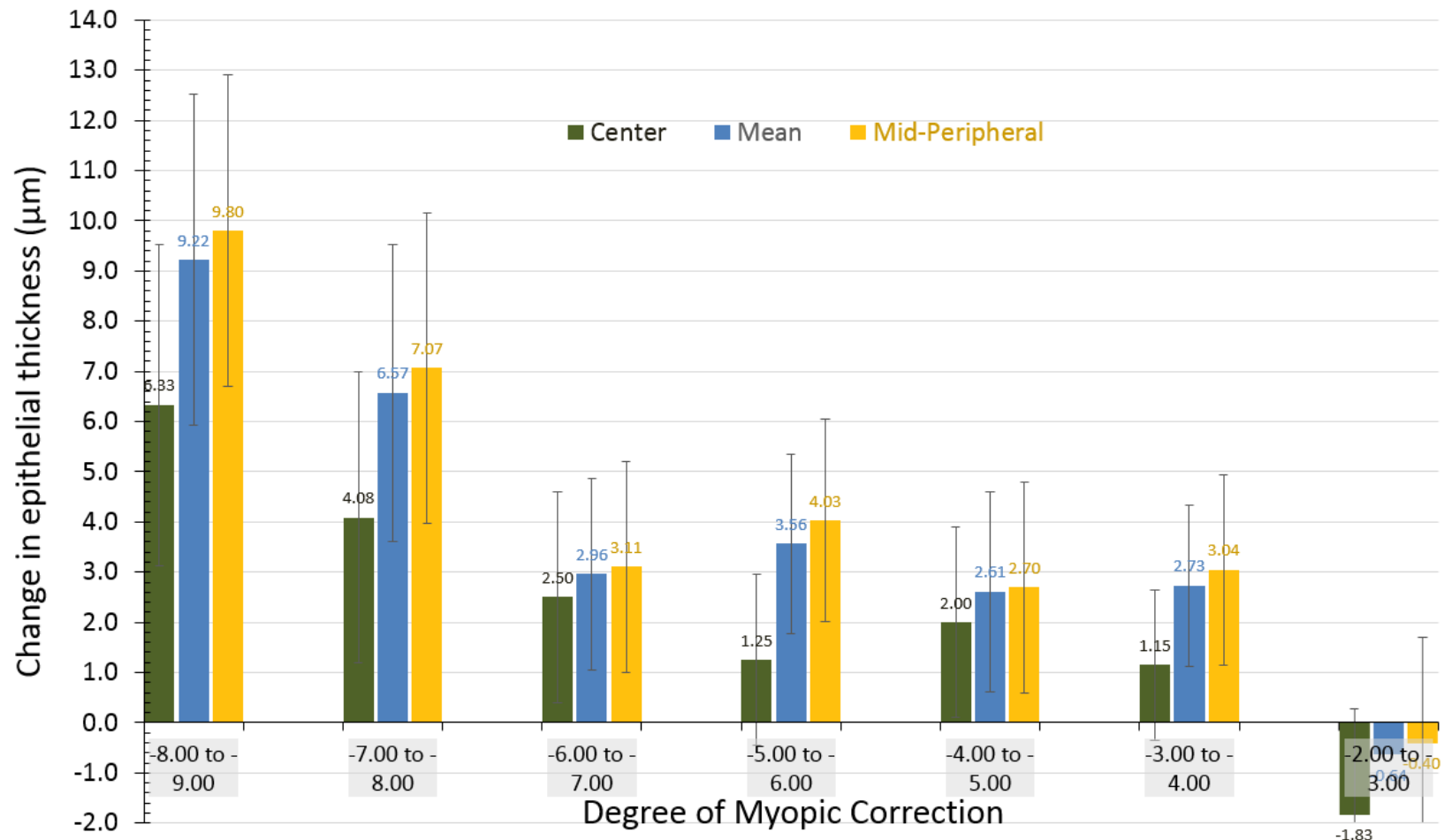
Average change in epithelial thickness

- center (d Center, green columns), the mean over the 6 mm diameter (d Mean, blue), and 5 mm mid-peripheral zone (d mid-peripheral, yellow), in comparison to the preoperative baseline levels at one day, one week, one month, and one year (12 months) postoperatively.
- Error bars indicate the standard deviation. All units in μm .



Correlation with myopia correction

- center (green dots), mean over the 6 mm diameter (blue), and 5 mm mid-peripheral zone (yellow). Error bars indicate standard deviation.



Discussion

- Increased epithelial thickness in high myopic LASIK cases may contribute to apparent refractive “regression”
- May be a biologic indicator of biomechanical instability: increased cornea oscillation may result in reactive epithelial hyperplasia as we have previously proposed* in ectatic and pre-ectatic corneas

*Kanellopoulos AJ, Aslanides I, Asimellis G,
Correlation between overall epithelial thickness in normal corneas, ectatic and ectatic previously treated with CXL corneas. Can overall epithelial thickness become a very early ectasia prognostic factor?
Clin Ophthalmol. 2012;6:789-800



Conclusions

- We investigated postoperative remodeling of corneal epithelial thickness distribution following femtosecond-assisted myopic LASIK correction by in vivo, clinically available Fourier-domain anterior-segment Optical Coherence Tomography.
- The noted increase at the one-month and up to one-year postoperative interval suggests post-operative epithelial activity, in connection to the extent of ablation.

