



## **Title: Corneal Biomechanics and Orthok Lens Wear**

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### **Abstract:**

#### Purpose

To determine whether corneal biomechanics influence the short-term effect of corneal molding following orthokeratology (OK) lens wear.

#### Methods

This was a prospective randomized study. A cohort of 29 participants (18-39 years; myopia  $\leq -5.50D$ ; astigmatism  $\leq -1.75D$ ; visual acuity  $\geq 6/9$ ) were recruited and seen on 3 occasions.

Corneal biomechanical indices were measured (Corvis, Oculus, USA), as was pachymetry (Pentacam, Oculus, USA) at the initial visit (V1) and after one night's wear (V2), then at the end of the day (V3).

Results were analyzed using paired-samples t-tests and correlation tests (r Pearson).

#### Results

At V2, central pachymetry (CP) and pachymetry at the thinnest point (PM) increased by  $12.0 + 18.2 \mu\text{m}$  (+2.2%) and  $12.6 + 19.4$  (+2.3%)  $\mu\text{m}$  respectively (CP 95%CI [-18.9; - 5.1]  $p= 0.001$ ; PM 95% CI [-20.0; -5.2]  $p= 0.002$ ).

At the end of the day, the cornea is thinner than at V1 (PC  $-2.6 + 6.7$  (95%CI [8.1; 21.3]  $p \leq 0.001$ )/PM  $-2.8 + 6.3 \mu\text{m}$  (95% CI [8.4; -22.4]  $p \leq 0.001$ ).

The cornea shows significant central flattening at V2:  $-0.62 + 0.41D$  ((95% CI [0.45; 0.77]  $p \leq 0.001$ ). It partially recovers at V3 ( $+0.22 + 0.28 D$  (95% CI [-0.32; -0.11]  $p \leq 0.001$ )).

The Ambrosio relative thickness-horizontal (ARTh) index is the only one to vary (V1-V2) (95% CI [25.8; 90.7]  $p \leq 0.001$ ). However, pachymetric changes were significantly correlated with the SPA-1 (stiffness parameter) index (PC  $r=0.368$ ,  $p \leq 0.05$ ; PM  $r=0.381$ ;  $p \leq 0.04$ ) at V2 and V3.



## Conclusions

The results indicate that OK lens wear generates nocturnal corneal edema. These changes correlate with certain indices of corneal rigidity. This suggests that stiffer corneas are more responsive but recover more quickly during the day.