

## Journal Article Review

**Heidelberg ANTERION Swept-Source OCT Corneal Epithelial Thickness Mapping: Repeatability and Agreement with Optovue Avanti**

Based on:

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**Background and Purpose**

The corneal epithelium is the first cellular layer of the eye. It plays an important role in the refractive system of the eye, smoothing out irregularities in the underlying stroma by either growing thicker over depressions or becoming thinner over bumps in a process known as epithelial remodeling. Epithelial thickness mapping (ETM) is a valuable tool in corneal and refractive surgery as well as in the early diagnosis of keratoconus. The authors of this study, which is the first to measure and analyze the epithelium using SS-OCT technology, assessed the repeatability of ETM measurements with the Heidelberg Engineering ANTERION and its agreement with the Optovue Avanti for healthy virgin, post-laser refractive surgery and keratoconic eyes.

**Methods**

The study included 90 virgin eyes, 46 eyes of patients with a history for previous laser refraction surgery and 122 keratoconic eyes. An experienced examiner took three consecutive measurements of each eye with each device. The ANTERION, using the 'Cornea App' mode with eye tracking, performs 65 radial scans centered on the corneal vertex mapping the epithelium over a 7mm zone. The Avanti, using the "pachymetry wide scan pattern" mode and attaching the "long adaptor lens", performs 8 radial scans over a 9mm diameter. Averages of the epithelial thickness mapping were calculated in the central 2-mm zone and in the 2- to 5-mm zone and 5- to 7-mm diameter rings. Repeatability was assessed by calculating the pooled within-subject standard deviation ( $S_w$ ). Agreement was assessed by calculating the following parameters: difference in thickness readings, 95% limits of agreement, and paired two-tailed  $t$  tests.

**Results**

$S_w$  ranges for the ANTERION and Avanti. Lower values of  $S_w$  indicate higher repeatability.

Repeatability of ETM Measurements		
Group	Repeatability, $S_w$ Ranges ( $\mu\text{m}$ )	
	ANTERION	Avanti
Virgin Eyes	0.64 - 1.01	0.98 - 1.11
Post-laser refractive surgery	0.60 - 1.36	0.75 - 1.96
Keratoconus	1.15 - 1.36	1.37 - 1.60

The 95% Limits of agreement and mean difference (Avanti minus ANTERION) in thickness measurements:

Agreement of ETM Measurements Between ANTERION and Avanti			
Group (Area 0 to 7mm)	95% Limits of Agreement ( $\mu\text{m}$ )		Mean Difference in Thickness measurements
	Lower	Upper	Mean $\pm$ SD ( $\mu\text{m}$ )
Virgin Eyes	0.523	7.598	4.06 $\pm$ 1.81
Post-laser refractive surgery	-1.679	8.199	3.26 $\pm$ 2.52
Keratoconus	-1.253	8.604	3.68 $\pm$ 2.51
All	-0.826	8.297	3.74 $\pm$ 2.33

## Conclusions

The repeatability of corneal epithelial thickness mapping with the ANTERION was higher than with the Avanti in virgin, post-laser refractive surgery, and keratoconic eyes. In terms of agreement, the epithelium measured by the ANTERION was always thinner compared to the Avanti for all 3 groups.