

# Comparison and Correlation of Carl Zeiss Meditec Cirrus HD OCT 6000 and Optovue Avanti OCT Anterior Segment OCT Devices in Central Epithelial Thickness Measurement.

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## Purpose and Background

Anterior segment optical coherence tomography (AS-OCT) allows for imaging and quantitative measurement of the anterior segment.<sup>1</sup> Two commonly used, high quality, commercially available spectral domain AS-OCT machines are the Carl Zeiss Meditec Cirrus OCT and the Optovue Avanti.

Previous studies have compared these two devices (and other AS-OCT machines) in various different measurements<sup>2</sup>, however to the best of our knowledge there has been no investigation into a comparison of epithelial thickness measurements.

**Purpose:** The aim of this study is to assess the correlation of epithelial thickness measurements from two spectral domain OCT devices, the Zeiss Cirrus HD OCT 6000 and the Optovue Avanti.

**Table 1.** Summary characteristics of OCT devices.<sup>1</sup>

OCT Type	Manufacturer	Optical Source	Axial resolution (optical)	Transverse resolution	Scan Speed (A-Scans per second)	Scan Depth	Maximum Scan Width
Cirrus OCT	Carl Zeiss Meditec, Dublin, CA	SLD 840 nm	5 μm	15 μm	100,000	2-2.9 mm	6 mm
Optovue Avanti	Optovue, Inc, Fremont, CA	SLD 840 nm	5 μm	15 μm	70,000	3 mm	12 mm

## Methods

Retrospective chart review was carried out for patients who had underwent a corneal assessment between November 5, 2021 and December 15, 2021 at Clarity Laser Vision and had an AS-OCT performed by both the Zeiss and the Optovue devices in the same visit at Clarity Laser Vision.

Patient baseline characteristics and central epithelial thickness measurements from both Zeiss and Optovue devices were recorded.

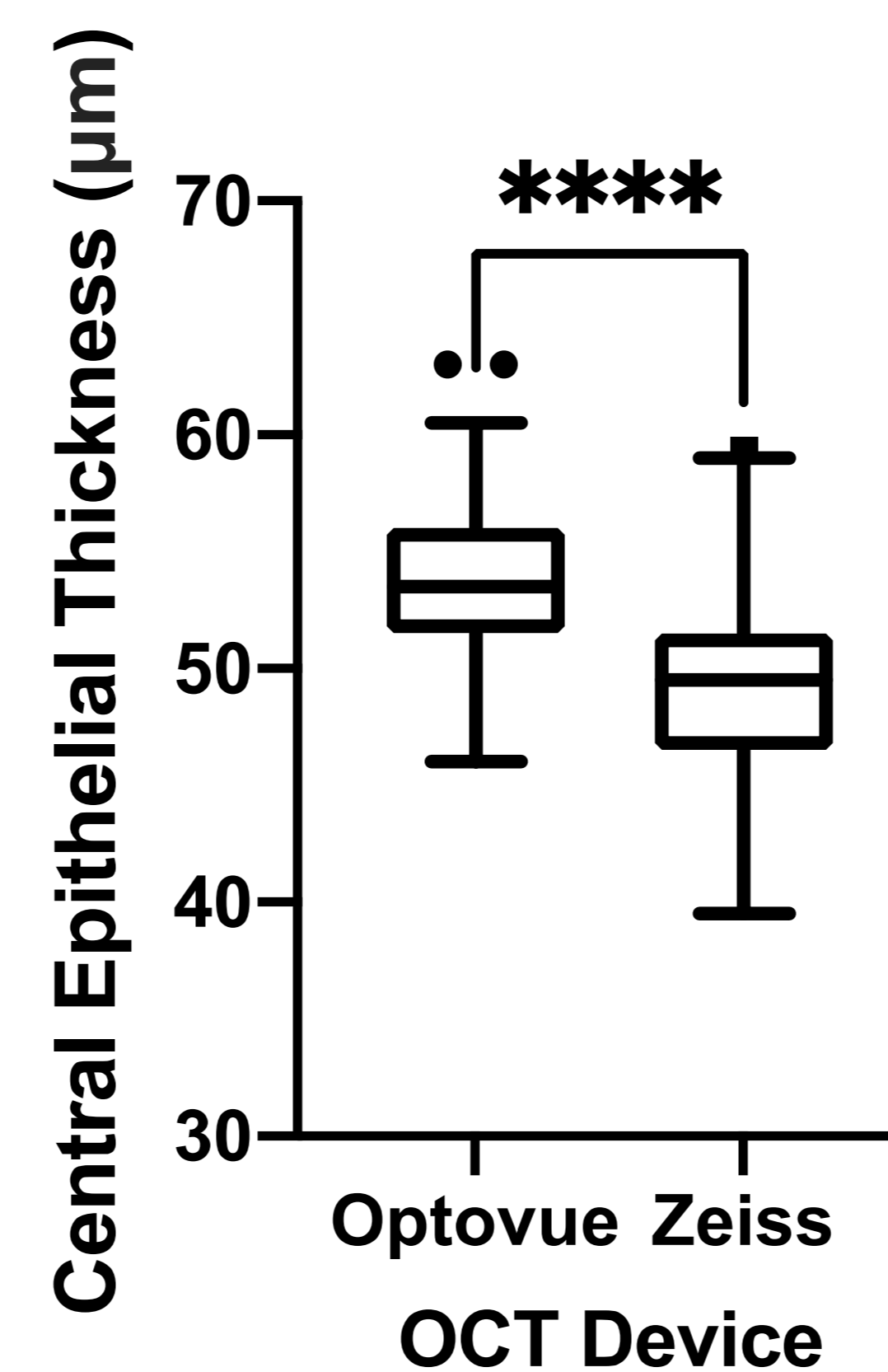
### Analysis:

- 1) Determine whether there is a significant difference between measurements from both devices
- 2) Determine if there is a relationship between the measurements of both devices through an appropriate regression analysis

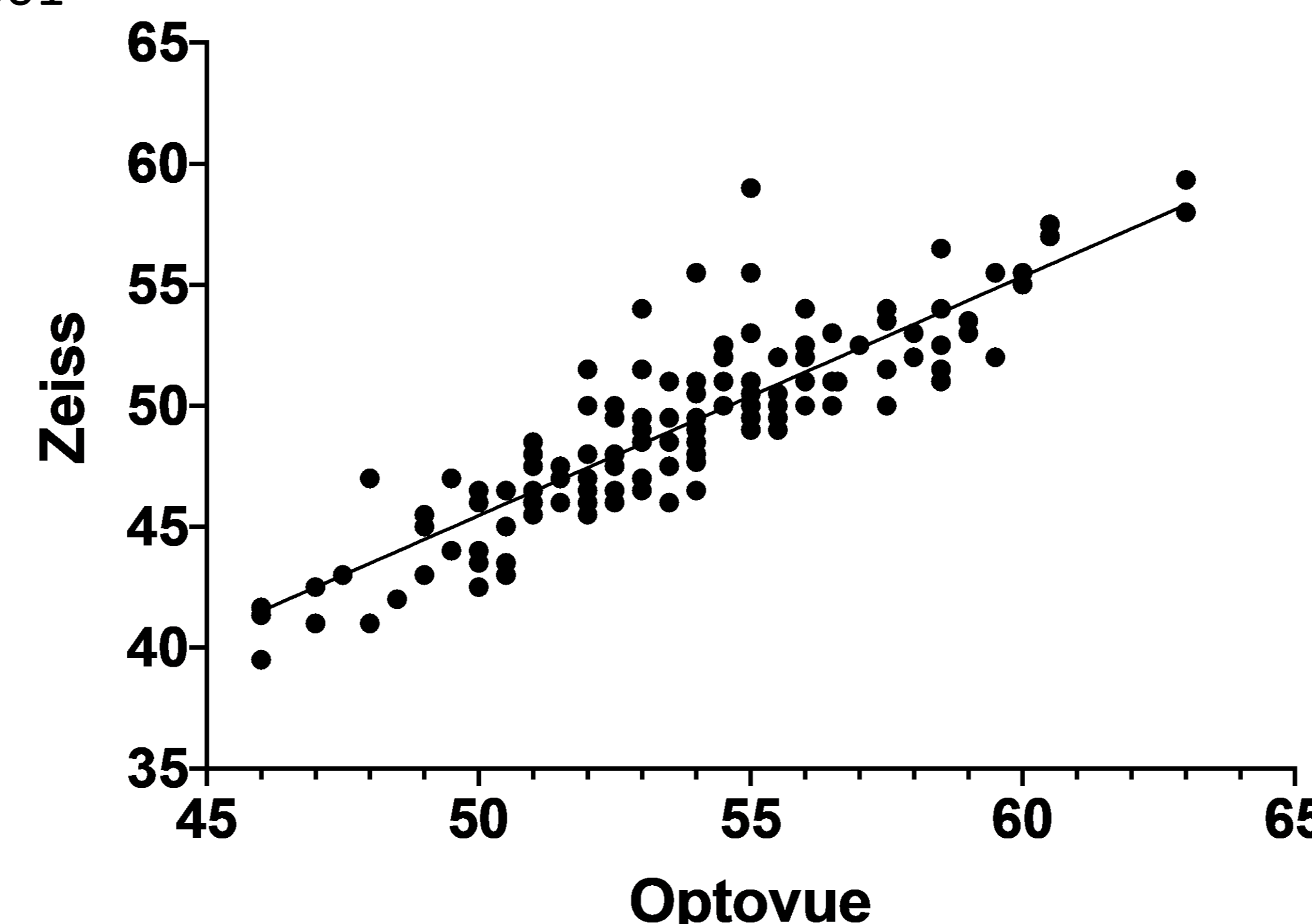
## Results

**Table 2.** Summary of sample characteristics and results

Number of eyes	134
Number of patients	67
Age (years), mean +/- SD	43.04 +/- 13.4
Female (%)	52 %
Optovue mean central epithelial thickness +/- SD	53.73 μm +/- 3.45 μm
Zeiss mean central epithelial thickness +/- SD	49.14 μm +/- 3.89 μm
Mean difference in measurement	4.59 μm (95% CI, 4.91 μm - 4.27 μm, P<0.0001)



**Figure 1.** Box and whisker plot of epithelial thickness for each device. The plots show the median (central stripe), interquartile range (box) and full range (whiskers), and outliers (observations beyond 1.5 times the interquartile range from the box). \*\*\*\* = P < 0.0001



**Figure 2.** Linear regression analysis of Zeiss and Optovue devices, R<sup>2</sup> = 0.77. Zeiss measurement was found to be equal to - 3.94 μm + 0.99 \* (Optovue measurement)

## Results (continued)

Zeiss measurements were corrected using the formula produced by the linear regression (Zeiss measurement was found to be equal to - 3.94 μm + 0.99 \* (Optovue measurement). Corrected values were not found to be significantly different from Optovue measurements, with a mean difference of 0.11 μm (95% CI -0.211 to 0.428μm, P = 0.5029).

## Discussion + Conclusions

- Corneal epithelial thickness measurements were significantly different between Optovue and Zeiss OCT. There was a strong positive linear correlation between the two instruments, with Zeiss measurements found to be slightly lower than Optovue measurements.
- These results align with previous work which revealed differences in measurements between Zeiss Cirrus HD and Optovue Avanti OCT in the posterior chamber<sup>2,3,4,5</sup>. It also more generally aligns with literature showing differences in measurements between various OCT machines<sup>3,4</sup>.
- **Future directions:** compare epithelial thickness measurements from different regions of the cornea to compare peripheral measurements
- **Epithelial thickness measurements produced by the Zeiss Cirrus OCT and Optovue Avanti OCT are not interchangeable. This study provides a correction method based on linear regression results that is effective in adjusting measurements from one device to be comparable to the other device.**

## References

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