# Comparison of biometric measurement on devices based on the principle of swept source OCT

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Purpose: This attestation work compares the biometric measurement of four biometric devices that work on the principle of ***swept source OCT, IOL Master 700 (Carl Zeiss Meditec), Argos (Movu Inc.), Anterion (Heidelberg Engineering) and Eyestar 900 (Haag- Streit AG)*** . The goal is to assess the compatibility of pairs of devices, determine the most accurate device.

Methods: A prospective study was conducted at the Refractive Center of the Department of Eye Diseases and Optometry at the University Hospital at St. Anna in Brno. 56 left eyes of 56 patients were included in the study. The patients were divided into group 1, in which the cataract was indicated for surgery, and group 2, where the patients had a clear lens. All patients underwent biometric measurement on all 4 devices on the same day. **The evaluated variables were axial length, mean keratometry, anterior chamber depth, and lens thickness**, which were subsequently statistically analyzed. A two-sample t-test was used to compare groups 1 and 2. Agreement between individual pairs of devices was examined for AL and K, as the most significant variables affecting IOL calculation, using the Bland-Altman plot and intraclass correlation coefficient.

Results: When comparing groups 1 and 2, no statistically significant difference was found in the variables axial length and average keratometry, on the contrary, in the variables anterior chamber depth and lens thickness, groups 1 and 2 differed statistically significantly for all devices, significance level $p<0.05$. There is no statistically significant difference in the axial length variable for the pair IOL Master 700 – Argos, Argos – Anterion and Argos – Eyestar 900, but the pair IOL Master 700 – Anterion, IOL Master 700 – Eyestar 900 and Anterion – Eyestar 900 are statistically significantly different. In our study, it was found that the **Argos device measures a larger axial length in shorter eyes and, on the contrary, measures a shorter axial length in longer eyes compared to other devices**. There is no statistically significant difference in the mean keratometry variable for the IOL Master 700 – Eyestar 900 pair. For all other pairs, we see a statistically significant difference, significance level $p<0.05$. The Anterion had the flattest keratometry, followed by the Eyestar 900, IOL Master 700, and the Argos had the steepest keratometry. This can be explained by the different size of the optical zone for keratometry in individual devices. The intraclass correlation coefficient was high for all pairs of devices in the variable axial length and average keratometry, with a significance of $p<0.01$. The Bland-Altman analysis showed a good measurement agreement for all pairs of devices for both variables at a limit of agreement of 95%. **The most accurate device in our study was the Argos biometric device**, in group 1 it had the smallest standard deviation in 2 out of 4 monitored variables, in group 2 even in 3 out of 4 monitored variables.

Conclusion: Based on the statistical analysis of our data, we demonstrated excellent agreement in the measured biometric variables axial length and mean keratometry between the IOL Master 700, Argos, Anterion and Eyestar 900 biometric devices. Although some pairs of devices showed a statistically significant difference, this difference is not clinically significant . When comparing groups 1 and 2, it was found that the presence of ***cataracts does not affect the accuracy of measuring axial length and average keratometry***, or these latest optical biometric devices allow very accurate measurement of axial length regardless of whether the lens is clear or cloudy.

**Resources (only most important):**

*1. ANTERION. In: Business-lounge.heidelbergengineering.com [online]. Heidelberg, Německo, 2023 [cit. 2023-07-04]. Dostupné z: https://business-lounge.heidelbergengineering.com/cz/en/products/anterion/*
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