

# COMPARISON OF THREE DIFFERENT BIOMETRY METHODS

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## INTRODUCTION

Exact measurement of axial length is of key importance for the calculation of the refractive power of the intraocular lens for cataract surgery. At present two methods are used. Ultrasound biometry has been used for the last 35 years and optical biometry for the past 30 years. Optical low coherence reflectometry (OLCR)-biometry was introduced only about 10 years ago. We report the first data of a new prototype measuring axial length applying optical low coherence reflectometry (OLCR)-biometry. OLCR is based on an interferometry method using a broad band light source (typically 20-30 nm broad). Advantages are that it is patient friendly, non-invasive, and is more accurate and faster. To evaluate this technique we compared axial length (AL), anterior chamber depth (ACD) in healthy eyes and in eyes with cataract using ultrasound biometry (UB), optical biometry (OB) and optical low coherence reflectometry (OLCR)-biometry.

## METHODS

OB (Zeiss), UB (Tomey) and OLCR biometry (Haag-Streit) were performed in 20 different subjects (10 healthy volunteers and 10 patients with cataracts). The volunteers included 5 men and 5 women (age 30 – 38) among whom 4 were myopic. Among the 10 patients with cataracts were 8 men (age 65 – 79) and 2 women (age 48 and 75). Eyes with AL >30 mm had been excluded. The patient was placed on a chin rest to aim the measurement beam. 16 single scans were used per measurement. 5 measurements were made and the smallest and largest discarded to give the final AL and ACD (+/- SD) (Figure 1 and 2). Statistical significance was tested for with the paired t-test. Bonferroni correction for multiple testing was applied. All measurements were performed according to the manufacturers recommendations. All examinations were approved by regulatory authorities as well as by the local and federal ethical commissions.

## RESULTS

In eyes with clear lenses, the mean AL was: OB 23.99 mm +/-0.93; UB 23.89 mm +/- 0.78; OLCR 24.02 mm +/-0.89 and the mean ACD was: OB 3.5 mm +/- 0.35; UB 3.61 mm +/-0.3; OLCR 3.13 mm +/- 0.36 (Figure 3 and 4). In eyes with cataract the mean AL was: OB 22.83 mm +/- 1.17; UB 22.78 mm +/- 1.12; OLCR 22.56 mm +/- 1.5 and the mean ACD was: OB 2.82 mm +/- 0.24; UB 3.17 mm +/-0.56; OLCR 2.66 mm +/- 0.43 (Figure 5 and 6). The average measurement time per patient was about 1 minute with OB and UB, and was faster with OLCR. No statistically significant differences were found between OB and the OLCR prototype. The only significant difference found was in the mean ACD of normal patients between UB and OB/OLCR.

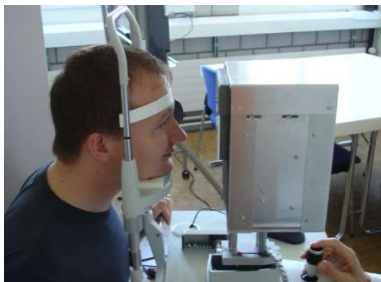


Figure 1: Patient being measured using the OLCR prototype

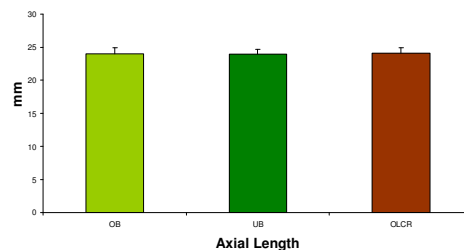


Figure 3: Mean axial length in healthy subjects

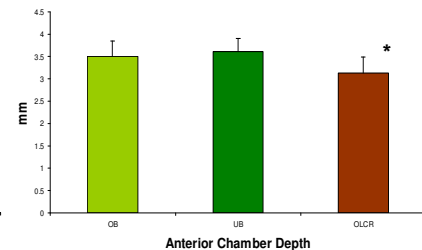


Figure 4: Mean anterior chamber depth in healthy subjects

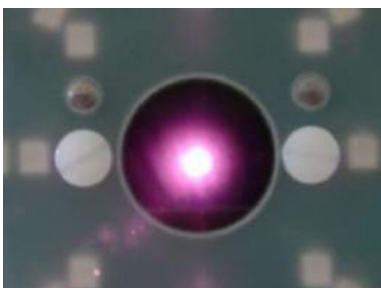


Figure 2: Measurement beam as seen by the patient

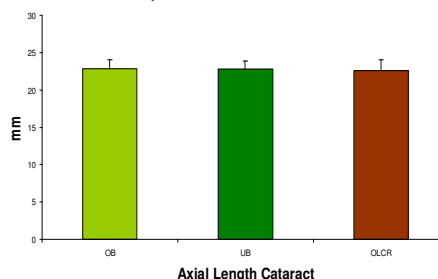


Figure 5: Mean axial length in cataract patients

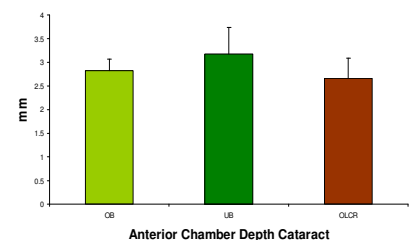


Figure 6: Mean anterior chamber depth in cataract patients

## CONCLUSION

UB, OB and the OLCR biometry give comparable results in patients with cataract and normal lenses. The new OLCR biometer prototype is a valuable way of measuring the axial length and the anterior chamber depth. Major advantages are the non-invasive method, precision and rapidity of OLCR which is overall a more patient friendly technique.