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Abstract Title: **Phakometric Measurement of Crystalline Lens Curvature, Tilt and Decentration During Edinger-Weshphal Stimulated Accommodation in Rhesus Monkeys**
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Purpose: To measure accommodative changes in lens radii of curvature, tilt and decentration in rhesus monkeys.

Methods: Accommodation was stimulated via the Edinger-Westphal (EW) nucleus in 4 iridectomized eyes of 2 anaesthetized rhesus monkeys. Accommodative stimulus response functions were measured with coincidence refractometry. Dynamic phakometry, ultrasound biometry and photorefractometry were performed in the same session, for identical stimulus amplitudes. A video Purkinje imaging system with a telecentric lens and 2 collimated light sources was used to measure crystalline lens curvature, tilt and decentration. To improve Purkinje image visibility, phakometry was performed with a plano lens filled with saline solution on the cornea. Lens anterior and posterior radii were calculated from reflections of the ocular surfaces (Purkinje images PI, PIII and PIV), using the equivalent mirror theorem and an iterative method. Lens tilt and decentration were calculated from the locations of PI, PIII and PIV from the limbus center assuming linearity between limbus center, eye rotation, lens tilt and decentration. The method was tested using computer simulations.

Results: Anterior and posterior lens radii were calculated with an accuracy of 0.11 and 0.07 mm, lens tilt with 0.089 deg and lens decentration with 0.009 mm. Accommodation ranged from 0 to 8.83 D. Average unaccommodated anterior and posterior lens radii were 9.89 ± 1.01 and -6.01 ± 0.43 mm, respectively and lens radii decreased linearly with accommodation in all eyes. Radii decreased at a rate of 0.36 ± 0.14 and 0.14 ± 0.03 mm/D for anterior and posterior lens surfaces. Average unaccommodated lens tilt was -9.33 ± 4.83 and -8.3 ± 4.39 deg, around the vertical and horizontal axes respectively. Average unaccommodated lens decentration was 0.63 ± 0.49 mm horizontally and -0.47 ± 0.21 mm vertically. In general, lens tilt and decentration increased systematically with accommodation, particularly horizontally. Tilt around y and horizontal decentrations increased with accommodation at a rate of 1.51 ± 0.75 deg/D and -0.08 ± 0.06 mm/D, respectively

Conclusions: Changes in lens radii with EW stimulated accommodation in rhesus monkeys are consistent with previous data in human eyes under natural accommodation. The amounts and change in lens curvature, tilt and decentration with accommodation are highly significant. These results are important to fully characterize accommodation in rhesus monkeys.

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