Progress and applications of biometry

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Accurate obtainment of parameters of the eyeball is crucial in both clinic and research. Main parameters include central corneal thickness, anterior chamber depth, axial length, keratometry, lens thickness, white to white, pupil diameter and so on. For example, central corneal thickness is critical laser in situ keratomileusis and glaucoma diagnosis, intraocular lens calculation. The topography was an essential method to evaluate the cornea shape and cornea disease just like keratoconus. Ultrasound was the main method to acquire most of those parameters for years and it was thought as a golden standard. The first optical biometer, the IOLMaster basing on partial coherence interferometry was introduced in 1999. The optical method had shown excellent repeatability and reproducibility in clinic and the accuracy had been confirmed in many studies. Since 2009, several optical biometers are available including the Lenstar, the Aladdin, the AL-Scan, the OA-1000, the Galilei G and the Pentacam AXL. The Lenstar which is based on optical low-coherence reflectometry is another widely used optical biometer comparable to the IOLMaster. Placido’s disk is a widely used technique to provide topography but it is unable to show the posterior surface of cornea. The Orbscan corneal topography system which is an optical-based, slit scanning instrument is the first one which can measures three-space points on the anterior and posterior corneal surfaces. However, it was gradually replaced by the Pentacam using Scheimpflug principle which showed higher repeatability, reproducibility and agreement with Placido. After that, Sirius which combines Placido and Scheimpflug shows its reliability in some studies. More recently, the OA-2000, the IOLMaster 700, the Argos which mainly based on swept-source optical coherence tomography are introduced for dense cataract.

Biography
Jinhai Huang, MD is the vice director of the National Engineering Research Center of Ophthalmology & Optometry, group leader of the Evaluation and Application Research of New Ophthalmology & Optometry Instruments Group. He sits in the editor board of the PLOS ONE and are reviewers for leading ophthalmology journals. He has published more than 110 research papers in leading domestic and international journals including the New England Journal of Medicine, Lancet, Journal of the American Medicine.

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