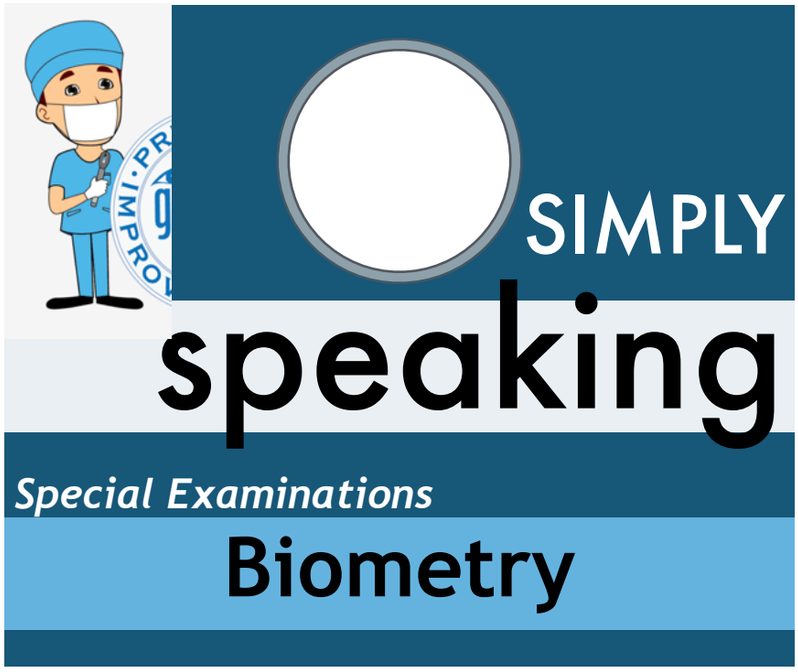


Each eyeball has characteristic measurements that differ from person to person and, even in the same person, from right to left. The relative length of the eyeball and the shape of the cornea are the strongest determinants of an eye's optical state. People whose measurements are perfectly proportional are usually emmetropic, i.e. they do not need spectacles to see 20/20. Eyes that are myopic or near-sighted generally have longer eyeballs while those that are far-sighted have usually shorter eyes.

Internally, behind the pupil, is the natural lens of the eye that contributes approximately 40% of the focusing power of the eye. Because of ageing and other conditions, this naturally clear lens becomes dense and less transparent, until it becomes opaque. The opacification of the natural lens is the Cataract. In cataract surgery, the opaque lens is removed. The focusing power of the removed cataract has to be replaced by an artificial lens (IntraOcular Lens, IOL) which is implanted during the operation.

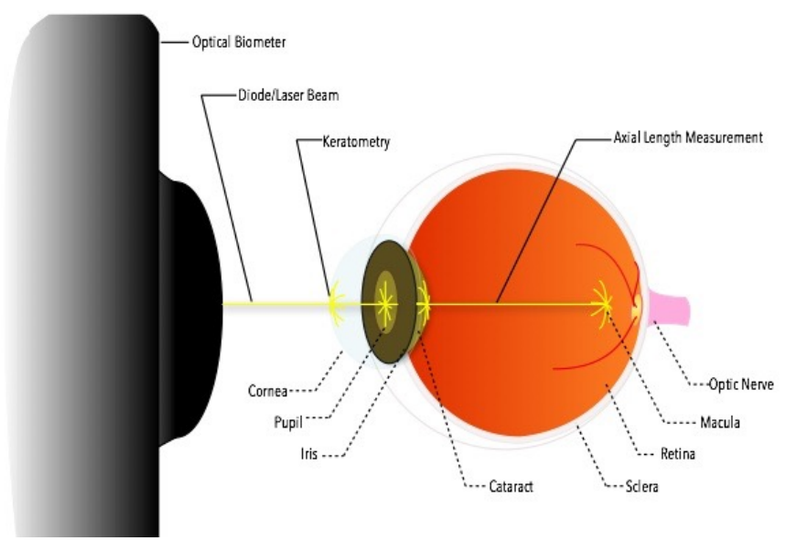
To be make the eye as close to emmetropic after cataract surgery, the IOL has to match the measurement of the eyeball. The principal role of biometry is to obtain those measurements that allow us to calculate the correct IOL power accurately. At Galileo, unless otherwise deliberately planned, we aim for an IOL power that will reduce the refraction of the patient to within +/- 0.50 diopters, or as close to plano ("zero" refraction). as possible. With plano refraction, the eye should be able to see 20/20 without the aid of glasses, barring any other eye problems.

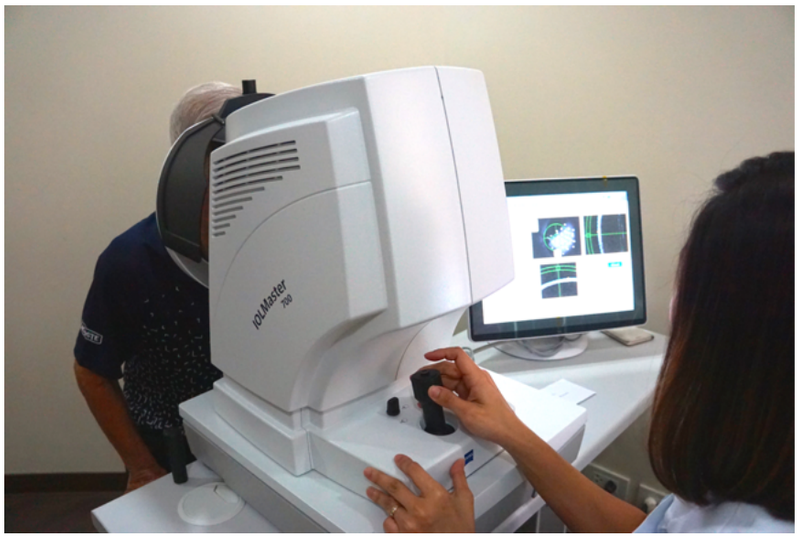
Keratometry

Keratometry determines the curvature of the cornea along the horizontal axis and the vertical axis. If the curvature along the one axis is different from the curvature along the other axis, the cornea causes astigmatism. Keratometry gives us values from which we can derive the focusing power of the cornea and the degree of astigmatism it causes. Not surprisingly, the instrument used for keratometry is called the keratometer.

Axial Length

How long the eyeball is from the front peak of the cornea (called the vertex) to the centre of the retina at the back (called the macula) is another crucial determinant of the correct IOL power. This axial length is measured by using an ultrasound or by using a pinpoint beam of light. Ultrasonic measurement is less precise than using light (optical biometry), hence whenever practicable the latter is the preferred method.





Optical Biometry

The correct IOL power is dependent on the biometry results and the formulae used to calculate the IOL power. The reliability of the biometry results is, in turn, dependent on the accuracy of the instrument and the capability of the technician. Our optometrists and nurses are among the best trained technicians in biometry.

We have two optical biometers, the Lenstar LS900 and the Zeiss IOL Master 700. These two biometers are partially automated and reduce the variation due to human error. Keratometry is incorporated into the machine. They also measure other parameters (such as the thickness of the cataract) to enhance the results of the biometry formulae.

In very dense cataracts where light cannot penetrate the lens, we augment the optical biometry results with ultrasound measurement.

Note

The optical quality of the IOL plays a huge factor in the optical results of surgery too. Other factors that are too complex to discuss here are dependent of the design and the material of the IOL. and the quality control processes of the IOL manufacturer. Monitoring the postoperative results of all those who have undergone surgery reveals the IOL factors that are important n achieving the desired outcomes.

At Galileo, we continuously refine our IOL calculations using better and better technology, utilizing reliable IOLs, surgical techniques and equipment, and perpetually monitoring the optical results and refractive outcomes of all eyes that have undergone cataract surgery since 2002.