NEXT GENERATION INTRAOCULAR LENS SOLUTIONS

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Cataract formation is a normal part of the aging process and as life expectancy increases more people will require surgery to treat cataract. Cataract surgery is very common with approximately 14 million surgeries performed per year worldwide. During routine cataract surgery the opaque lens of the eye is removed and replaced with an artificial lens called an IntraOcular Lens (IOL). Figure 1 shows a typical IOL structure composed of two main parts: the optic (the lens) and the haptics (the struts). IOLs are usually made of Poly methyl methacrylate, Silicon or Acrylic.

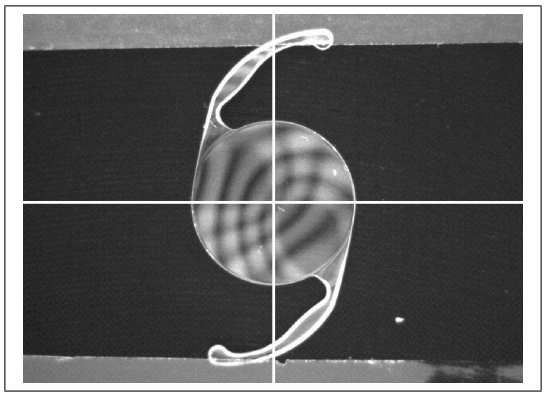

FIGURE 1. A typical IOL

Current technology used to treat cataracts is highly sophisticated and involves remarkable skills. By contrast, the process used to determine the required IOL power is outdated and unsatisfactory. Our research aims to improve the visual outcome of cataract patients by establishing a comprehensive scientific methodology regarding IOL design and selection process. The current approach used by industry for IOL selection will be revised where appropriate and in some aspects totally re-designed. This should lead to improvements which will enable better surgical outcomes for many people.

Currently the calculation of required IOL power is based on formulas which have developed from basic geometrical optics and step vergence equations (equation 1) combined with statistical analysis of retrospective cases. We approach the topic with the aim to remove fudge factors and approximations inherent in the current industry standard formulas. We aim to use extremely accurate measurements of ocular parameters to build individualised eye models. The model will then be used to determine the optimal customised IOL design. Our approach will offer the greatest benefit to unusual eyes (e.g. extreme axial length or extreme corneal shape) whose required IOL power is poorly predicted by standard methods.

$$P = \frac{n_{vitreous}}{l - c} - \frac{n_{aqueous}}{(n_{aqueous}/K) - c} \tag{1}$$

A geometrical optics equation for emetropic IOL power, where n is refractive index, l is axial length in meters, K is the corneal power in diopters, and c is the axial depth from the cornea to the IOL in meters.