Summary

The cornea is the transparent membrane covering the front of the eye. It is a powerful refracting surface, providing 2/3 of the eye's focusing power. The adult cornea is only about 1/2 millimeter thick and is comprised of 5 layers: epithelium, Bowman's membrane, stroma, Descemet's membrane and the endothelium.

The individual variation in the corneal rigidity has been suggested to be related to the physical dimensions of the tissue especially its thickness. Thus, CCT could be regarded as an indirect measurement of corneal rigidity. Other biomechanical parameters such as elasticity or viscoelastic properties may also influence the corneal resistance.

Corneal Hysteresis (CH) is considered an indicator of the visco-elastic properties of the cornea, i.e. the ability of the tissue to absorb and dissipate energy. It is suggested that subjects whose corneas exhibit low CH (soft cornea), are probable candidates for a variety of ocular diseases and complications. CRF is a measurement of the cumulative effects of both the viscous and elastic resistance encountered by the air jet while deforming the corneal surface. The recently developed

Ocular Response Analyzer proposes to measure corneal biomechanical properties in vivo.

Potential clinical applications of the CH and CRF measurements in the area of refractive surgery are obvious. CCT is a primary factor used for screening candidates for refractive surgery. Patients with thinner corneas are considered to be at higher risk of developing post-LASIK corneal ectasia.

The easily identifiable differences in CH and CRF between normal and compromised corneas suggest how these metrics provide a more complete characterization of the biomechanical state of the cornea than CCT. This observation, coupled with the fact that CH and CRF are only weakly correlated with CCT, leads us to believe that the corneal hysteresis measurement will be a useful tool for laminating potential LASIK patients who are at risk of developing post-LASIK ectasia. They also have potential uses in post-LASIK follow up.

Clinical data from several studies show a universal reduction in post-LASIK CH and CRF. Some experts hypothesize that reduced post-LASIK CH/CRF is not primarily a function of corneal thinning, but rather a result of weakening of the structure related to the creation of the flap and laser ablation, which change the visco-elastic characteristics of the cornea.

The ORA measure (**IOP**CC) that is less influenced by corneal properties, so it facilitates post-LASIK pressure measurements that are not artificially lower than pre-LASIK values. GAT-measured IOP values are known to drop 2-6 mmHg, or more, post LASIK.

Glaucomatous subjects have a significantly lower than average Corneal hysteresis and a much wider range. Currently individuals who have NTG are often missed during routine IOP screening. Obviously it would be a tremendous breakthrough if corneal hysteresis is proven to be a reliable indicator of this disease condition. Also note that signals obtained from eyes of NTG subjects looks similar to the signals obtained from keratoconus, Fuchs’, and post-LASIK patients,reinforcing the theory that glaucomatous damage, in some manner, presents itself via the cornea.

GAT is of questionable accuracy in practice, being a contact tonometer, it can damage the cornea and communicate disease between patients.also,it is not easily used by clinical assistants. And so, due to these errors in measurement of IOP, recent discoveries have led to the development of Ocular

Responnse Analyzer which achieves several goals in mind; One goal is to obtain an IOP reading that is independent of corneal factors and closely resembles the true IOP. A second goal has been to characterize the corneal biomechanical factors, not only to obtain the correct IOP, but also to detect the prognosis in the development of glaucoma.Finally, it is easy to use.