

Is Corneal Thickness a Predictor for Susceptibility to Glaucoma?

LSU-Tulane Ocular Biomechanics Lab

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Glaucoma is an optic neuropathy that is usually associated with elevated intraocular pressure (IOP), but there is wide disagreement over the role of IOP in the development and progression of the disease. The LSU-Tulane Ocular Biomechanics Group is funded by the National Institutes of Health to study the biomechanical mechanisms that underlie damage to the load-bearing connective tissues in the monkey optic nerve head (ONH) in glaucoma.

This senior research project focuses on the relationship between the thickness of the cornea and the peripapillary sclera (immediately surrounding the ONH) of both normal and glaucomatous monkey eyes. Peripapillary scleral thickness is thought to be a major determinant of the biomechanical response of the optic nerve head to varying levels of intraocular pressure. Currently there is no method available to measure peripapillary scleral thickness *in vivo*. We hypothesize that corneal thickness, which is easily measured clinically, serves as a predictor of peripapillary scleral thickness, and hence may predict susceptibility of the contained optic nerve head to elevated IOP. The primary aims of this project are:

- a) Measure corneal scleral thickness *in vivo* (using clinical pachymetry) and *in vitro* (using histomorphometry)
- b) Measure scleral thickness within high-resolution digital 3-D reconstructions of the ONH and peripapillary sclera
- c) Assess the thickness of the cornea as a predictor of peripapillary scleral thickness
- d) Determine the artifactual change in thickness of corneal tissues due to perfusion fixation in aldehyde-based fixatives as compared to *in vivo* measurements
- e) Characterize differences in corneal thickness and peripapillary scleral thickness across eyes and animals in three treatment groups (normal, early glaucomatous, and moderate glaucomatous)

We are interested in attracting a highly qualified, self-motivated undergraduate student that is interested in working at the leading edge of clinical medicine and biomedical engineering. The successful candidate will gain extensive experience in clinical measurement of corneal thickness, imaging and image analysis, histology and histomorphometry, measurement and data mining in three-dimensional medical images, experimental design, and data analysis. The successful applicant will be employed at a competitive salary by the LSU Eye Center for 12 weeks during the summer of 2004, during which time the majority of the research and data collection will be performed.