

Poster #3**Kasra Zarei****Undergraduate, College of Engineering
Biomedical****Title of Research:** Automated Axon Counting in the Optic Nerve Of Mice**Other Authors:** Mark Christopher, Kathy Miller, John H. Fingert, Todd E. Scheetz, Michael D. Abramoff**Introduction/Purpose:**

Glaucoma is the second highest cause of blindness in the world today. Recent work has demonstrated the role of the TBK1 gene in glaucoma. In mice, there is no published information on how axons compare in mutants for the TBK1 gene and wild-type mice. There is believed to be a decrease in the number of axons in mutant mice compared to wild-type mice, and there is also greater loss in smaller axons compared to larger axons.

Experimental Design:

We developed an image-processing methodology to obtain accurate axon counts of the optic nerves in mutant and wild-type mice. Our technique was used to obtain axon counts for the optic nerves of 22 mice.

Results:

Our method yields accurate cell counts compared to truth counts by humans ($r = 0.94$) and a 9% difference in axon counts in wild-type and mutant ($P\text{-value} = 0.0004$). Additionally, there is a significantly greater loss in smaller-sized axons compared to larger-sized axons.

Conclusions:

Our axon counting process can generate automated axon counts with considerable accuracy. Additionally, our method has provided new findings related to glaucoma research that have not been conducted by other scientists.