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Yu-Min Chung* (yumchung@alumni.iu.edu). *On the morphology of mitochondria via a multi-parameter persistent homology approach.*

Mutations in autophagy-gene Optineurin (OPTN) are associated with Primary Open Angle Glaucoma (POAG) and amyotrophic lateral sclerosis, but the pathophysiological mechanism is unclear. The E50K OPTN mutation is associated with glaucoma. Recent studies have shown that OPTN may play an important role in regulating mitochondrial networks and interacting with parkin as part of the mitophagy pathway. We hypothesized that loss of normal OPTN function disrupts mitochondrial morphology. To investigate and quantify the phenomena, we use multi-parameter persistent homology on confocal images of cells from transgenic mice with the E50K mutation and genetic knockout of optineurin. In particular, we combine methods in mathematical morphology to form a multi-parameter filtration. We will show that such filtration contains both topological and geometric information about the mitochondria, and will demonstrate ways to extract meaningful features from it. (Received September 21, 2021)