Abstract Submitted
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Molecular kinetics and axonal Morphodynamics[1] YINYUN LI, Department of Physics and Astronomy and Quantitative Biology Institute, Ohio University, CHEN YING, Department of Physics and Astronomy, Ohio University and Department of Science, Beijing institute of Technology, PETER JUNG, Department of Physics and Astronomy and Quantitative Biology Institite, Ohio University, ANTHONY BROWN, Center for Molecular Neurobiology and Department of Neuroscience, Ohio State University — Caliber is an important feature of axons which is exquisitely tuned to its electrophysiologic function. Although there is a large variety of axonal calibers (even within one cell), the regulatory mechanisms giving rise to these shapes are not understood. Mechanical integrity of the mature neuronal axon is provided by neurofilaments (NF). The local number of NFs determines axonal caliber. Their net transport at the average slow rate of about 0.5 mm/day is characterized by bursts of movement and extended pauses. Our main hypothesis is that the influx and kinetics of NFs are the determinants of axonal caliber and overall morphology. We use a well-tested mathematical model for the molecular kinetics of NFs to generate hypotheses how these kinetics are modified along the axon in order to generate observed distributions of NFs. Our experimental model system is the mouse optic nerve as the axons therein are unbranched, and detailed experimental data for the NF distribution along the axon and their overall kinetics obtained through radio-isotopic pulse labeling are available.

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