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Mechanical Models of Microtubule Bundle Collapse in Alzheimer's Disease[1] AUSTIN SENDEK, RAJIV SINGH, DANIEL COX, UC Davis — Amyloid-beta aggregates initiate Alzheimer's disease, and downstream trigger degradation of tau proteins that act as microtubule bundle stabilizers and mechanical spacers. Currently it is unclear which of tau cutting by proteases, tau phosphorylation, or tau aggregation are responsible for cytoskeleton degradation., We construct a percolation simulation of the microtubule bundle using a molecular spring model for the taus and including depletion force attraction between microtubules and membrane/actin cytoskeletal surface tension. The simulation uses a fictive molecular dynamics to model the motion of the individual microtubules within the bundle as a result of random tau removal, and calculates the elastic modulus of the bundle as the tau concentration falls. We link the tau removal steps to kinetic tau steps in various models of tau degradation.

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