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**Thomas G. Fai\*** (tfai@seas.harvard.edu), 29 Oxford St., Cambridge, MA 02138. *Active vesicle transport into Dendritic Spines.*

We use lubrication theory to model the fluid dynamics of vesicle transport into dendritic spines, which are micron-sized structures at which neuronal postsynapses are located. Dendritic spines are characterized by their thin necks and bulbous heads, and recent high-resolution 3D images show a fascinating variety of spine morphologies. Our model, which has been validated by 3D lattice Boltzmann simulations, reduces the dynamics of vesicle motion to two essential parameters representing the system geometry and elasticity and allows us to thoroughly explore phase space. Upon including competing molecular motor species that push and pull on vesicles, we observe multistability that we speculate neurons could exploit in order to control spine growth. The bifurcations of the resulting dynamical system illustrate the levers the cell may adjust in order to achieve different behaviors. (Received October 24, 2017)