

Turning the Growth Cone Requires Membrane Endocytosis

The growth cone grows through membrane turnover by the exocytosis of vesicles and the incorporation of their membranes into selective parts of the cell membrane. These vesicles (sometimes called “enlargeosomes”) are constructed in the neuron cell body and travel on microtubules to the center of the growth cone (Pfenniger et al. 2003; Rachetti et al. 2010). Most of these vesicles are involved in the constitutive growth of the axon, not the directional growth of the growth cone. Some of these vesicles, however, are transported from the central region into the periphery in response to Ca^{2+} signals coming from membrane receptors. The vesicles then integrate into the tip of the growth cone and function (perhaps exclusively) in turning the growth cone toward attractive stimuli (Tojima et al. 2007). Repulsive cues have been found to initiate endocytosis (the opposite of exocytosis, bringing vesicles formed from cell membranes into the cell) in those areas they contact, which would have the effect of both removing the receptor and of diminishing the amount of cell membrane in that area (Hines et al. 2010; Tojima et al. 2010). Thus, by cytoskeleton assembly, cell adhesion, and membrane turnover, the growth cone mechanically transports the axon toward its appropriate target.

Literature Cited

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