Rab GTPase signaling in neurite outgrowth and axon specification

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 Neurons are highly polarized cells that contain specialized subcellular domains involved in information transmission in the nervous system. Specifically, the somatodendritic compartment receives neuronal inputs while the axons convey information through the synapse. The establishment of asymmetric domains requires a specific delivery of components, including organelles, proteins, and membrane. The Rab family of small GTPases plays an essential role in membrane trafficking. Signaling cascades triggered by extrinsic and intrinsic factors tightly regulate Rab functions in cells, with Rab protein activation depending on GDP/GTP binding to establish a binary mode of action. This review summarizes the contributions of several Rab family members involved in trans-Golgi, early/late endosomes, and recycling endosomes during neurite development and axonal outgrowth. The regulation of some Rabs by guanine exchanging factors and GTPase activating proteins will also b