As p21 protein promotes survival and fiber outgrowth of cultured embryonic neurons

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Abstract

Although evidence obtained with the PC12 cell line has suggested a role for the ras oncogene proteins in the signal transduction of nerve growth factor-mediated fiber outgrowth, little is known about the signal transduction mechanisms involved in the neuronal response to neurotrophic factors in nontransformed cells. We report here that the oncogene protein T24-*ras*, when introduced into the cytoplasm of freshly dissociated chick embryonic neurons, promotes the in vitro survival and neurite outgrowth of nerve growth factor-responsive dorsal root ganglion neurons, brain-derived neurotrophic factor-responsive nodose ganglion neurons, and ciliary neuronotrophic factor-responsive ciliary ganglion neurons. The proto-oncogene product c-Ha-*ras* also promotes neuronal survival, albeit less strongly. No effect could be observed with truncated counterparts of T24-*ras* and c-Ha-*ras* lacking the 23 C-terminal amino acids including the membrane-anchoring, palmityl-accepting cysteine. These results suggest a generalized involvement of *ras* or *ras*-like proteins in the intracellular signal transduction pathway for neurotrophic factors.