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## Target-Independent Specification of Proprioceptive Sensory Neurons

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## Abstract

Previous studies in the chick embryo have shown that sensory neurons fail to innervate muscle in the absence of motor neurons. Instead, motor neuron deletion causes more sensory axons to project to the skin. We used this experimental paradigm to determine when sensory neurons are specified to become proprioceptive afferents. Experimental embryos were treated with either saline or exogenous neurotrophin-3 (NT-3) to promote the survival of proprioceptive afferents. In saline-treated embryos, motor neuron deletion caused an increase in sensory neuron apoptosis on the deleted side, an effect reversed by NT3. Motor neuron deletion also eliminated the sartorius muscle nerve, as previously reported. In NT3-treated embryos, this altered nerve pattern was accompanied by the enlargement of the adjacent cutaneous nerve. These embryos were further analyzed by using immunohistochemistry for trkC (a receptor for NT3) retrograde and transganglionic labeling. Our results show that, following motor neuron deletion, more trkC+ afferents project in cutaneous nerves on the deleted side of NT3-treated embryos. Transganglionic labeling demonstrated that at least some of these neurons made spinal projections that are typical of proprioceptive afferents. These results therefore indicate that the proprioceptive phenotype is specified prior to target innervation and that these neurons can retain their identity despite projecting to inappropriate (cutaneous) targets.


## Keywords

neurotrophins; neurotrophin-3; sensory neurons; cutaneous afferents; muscle afferents; proprioceptive afferents; motor neurons; spinal cord projections; fate specification; differentiation



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