A role for neuregulin1 signaling in muscle spindle differentiation

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Author(s) Hippenmeyer, Simon; Shneider, Neil A; Birchmeier, Carmen; Burden, Steven J; Jessell, Thomas M; Arber, Silvia
Author(s) at UniBasel Arber, Silvia ;
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The maturation of synaptic structures depends on inductive interactions between axons and their prospective targets. One example of such an interaction is the influence of proprioceptive sensory axons on the differentiation of muscle spindles. We have monitored the expression of three transcription factors, Egr3, Pea3, and Erm, that delineate early muscle spindle development in an assay of muscle spindle-inducing signals. We provide genetic evidence that Neuregulin1 (Nrg1) is required for proprioceptive afferent-evoked induction of muscle spindle differentiation in the mouse. Ig-Nrg1 isoforms are preferentially expressed by proprioceptive sensory neurons and are sufficient to induce muscle spindle differentiation in vivo, whereas CRD-Nrg1 isoforms are broadly expressed in sensory and motor neurons but are not required for muscle spindle induction.
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