

Neurotrophic function of thymosin-beta in the development and regeneration of the nervous system

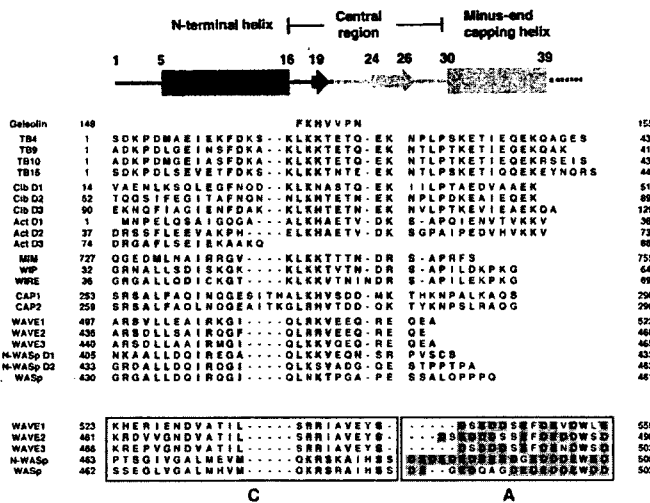
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Thymosin-betas (T β s) are polypeptides abundant in the cytosols, nucleus and extracellular spaces of many cell types. In the nervous system, the expression of T β s is regulated during the CNS development and following neuronal insults in cell-type and brain-region dependent manners, which may be related to the function of T β s in the growth and regeneration of the nervous system. Supporting this idea, overexpression of T β s in neurons modifies the axonal branches *in vivo* and neurite branches *in vitro*, which is dependent on the actin binding activity of T β s. In addition, recently we found that T β s suppress the apoptotic neuronal death in chick embryos, and these functions are mediated by the extracellular secreted form(s) of T β s. These results suggest that T β s play neurotrophic roles for the neuroprotection and neuronal growth/regeneration via their cytosolic actin-remodeling activity, and extracellular anti-apoptotic activity. While it is required to be elucidated, we also observed that T β 15 is translocated into the injured neuronal nuclei, and this event appears to be related to the eliminatory procedures of the injured cells. Collectively, these multiple functions of T β s may be beneficial for the neuronal diseases by prevention of neuronal death or promotion of neuronal regeneration.

Emerging neurotrophic function of thymosin betas in the development and regeneration of the nervous system

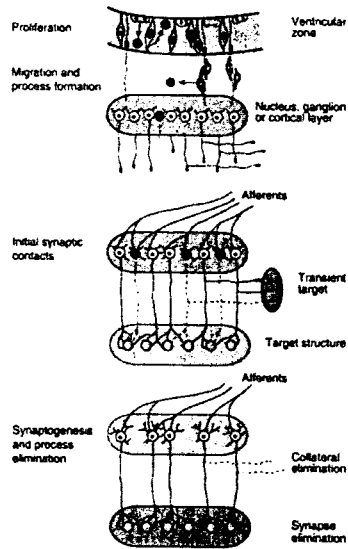
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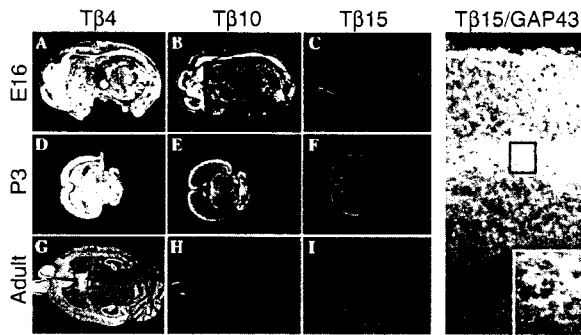


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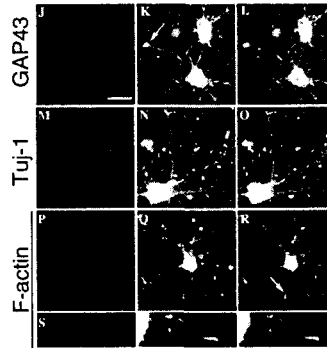
Histogenesis of the Nervous System during Development



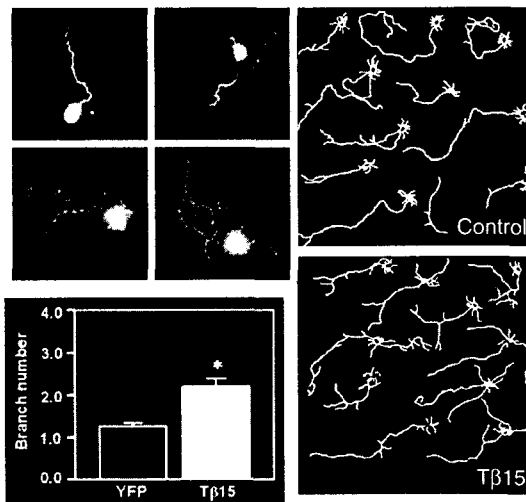
Expression of thymosin β s in the developing nervous system



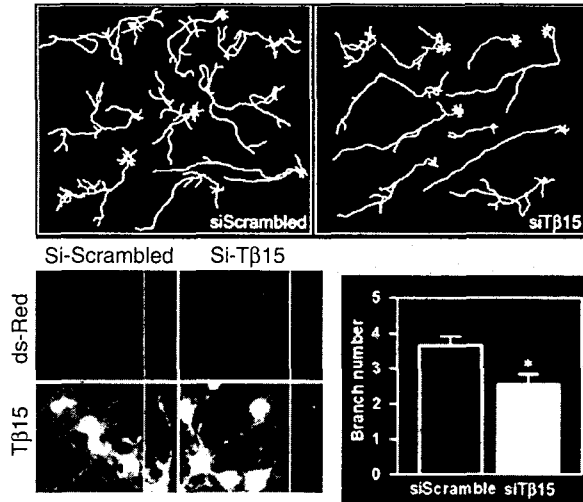
Distribution of thymosin β 15 in the growth cones



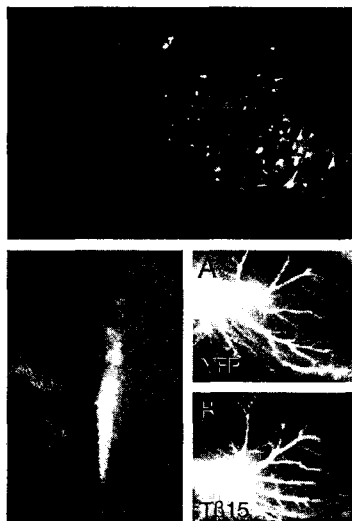
Promotion of neurite development by T β overexpression



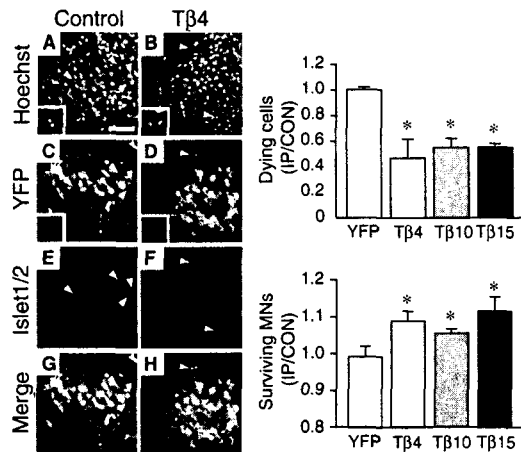
Suppression of T β expression retards neurite development



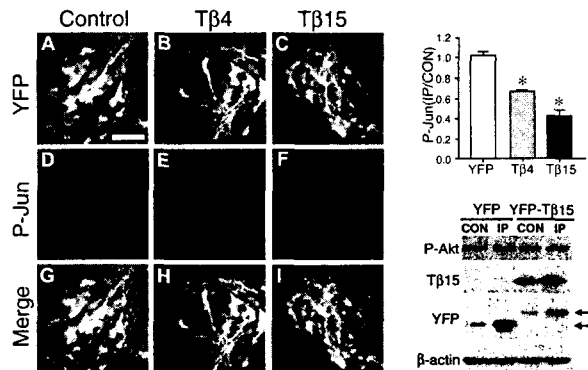
Electroporation of thymosin beta in chick embryos



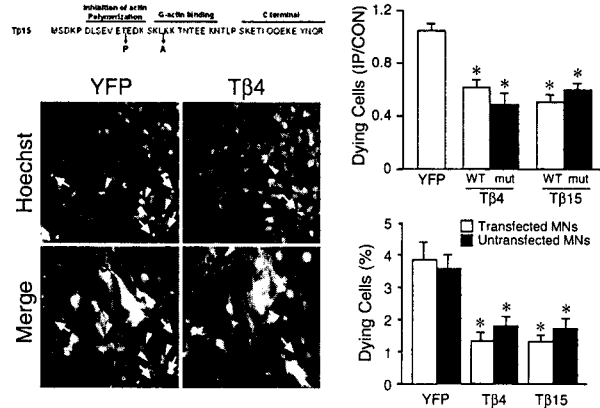
Thymosin β s prevent programmed cell death of motoneurons



Thymosin β suppresses phosphorylation of c-Jun



Anti-apoptotic effect of Thymosin β is non-cell autonomous



Summary: Schematic model

