

Multiple roles of neurotrypsin in tissue morphogenesis and nervous system development suggested by the mRNA expression pattern

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We have mapped the spatio-temporal expression of the multidomain serine protease neurotrypsin in the developing mouse by in situ hybridization. On embryonic day (E) 8, mRNA is detected in giant trophoblast cells, then in several mesenchymal tissues, most intensely in derivatives of the first branchial arch. On E11, expression is detected in Schwann cell precursors, olfactory epithelium, trigeminal ganglion, and in the midbrain and medulla. On E12, the floor plate and raphe region show a burst of strong expression. Further prenatal development is characterized by rising neurotrypsin mRNA in immature Schwann cells, in dorsal root and sensory cranial nerve ganglia, but also in spinal and brainstem motor neurons and a subset of other nuclei of the brainstem. In the forebrain, expression is largely restricted to the cortex, where it emerges toward birth. However, substantial prenatal expression is only observed in olfactory, perirhinal and insular cortices. After birth, expression is gradually lost from peripheral nerves and non neuronal tissues, but increases in the neocortex, where it culminates toward the end of the first postnatal week with a complex laminar and areal pattern. During the third postnatal week, the adult distribution is gradually established with continued expression in restricted areas of cerebral cortex, in motor neurons, and in sensory ganglia. This developmental expression pattern suggests roles of neurotrypsin in morphogenesis of non-neural tissues, as well as in neural development, in particular in axonal target invasion, synaptogenesis, and Schwann cell differentiation.

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Themes

1st choice: A. Development, 1. Synaptogenesis and Activity-Dependent Development, b. Synapse formation CNS. 2nd choice: A. Development, 2. Neurogenesis and Gliogenesis, g. Glial differentiation.

Key words: cerebral cortex, proteolysis, hippocampus, neuronal differentiation