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Study of the differentiation of interneurons in the neurotransplants of the rat fetal neocortex

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At present, the experimental elaborations of cellular technologies to stimulate nerve regeneration are carried out actively. There is evidence that the neural stem/progenitor cells, as well as fragments of embryonic rat brain promote the growth of the recipient regenerating axons after transplantation into the nerve or a conduit. However, the fate of the transplanted cells: their differentiation and their neurotransmitter nature are poorly understood. In the present study, different subsets of interneurons in the rats Wistar rat neocortex and in neocortical transplants developing in damaged nerve were studied. The fragments of the wall of the anterior cerebral vesicle of rat embryo (E 14) were transplanted into the crushed sciatic nerve of adult rats (n=15). The interneurons were identified by the following immunohistochemical markers: glutamate decarboxylase (GAD 67) for GABA-ergic nerve cells, NO-synthase (NOS) - for NO-ergic neurons, and choline acetyltransferase (ChAT) - for cholinergic cells. It has been shown that the majority of interneurons in the motor and the somatosensory cortex of rats (P 20) are GAD-67- immunoreactive (ir). They are located in all layers of the neocortex, have different sizes and long processes. Single cholinergic neurons are located in all layers of the rat neocortex, but mostly in the upper layers. They are usually bipolar and have long processes (70-80 μ m) directed perpendicularly to the surface of the brain. One month after surgery the individual GAD 67-ir, NO- ir, and ChAT- ir cells were detected in the graft. Thus, a part of progenitor cells retains their characteristic phenotype and the ability to synthesize the neurotransmitter in the changing microenvironment. However, in contrast to the neurons developing in situ the transplanted interneurons did not reach differentiation of neurons. They had few cytoplasm and short processes.

Biography

Petrova E S is a Senior Researcher of IEM. She graduated from the Leningrad (St. Petersburg) State University. Her thesis was devoted to neurotransplantation of fetal brain (1991). She is co-author of 40 scientific articles indexed in Scopus. Research interests are histogenesis and regeneration of nerve tissue, neurotransplantation

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