Transplantation of the fetal nerve cells in early post-reanimation period in rats

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Introduction: Cell technologies are widely used in medical practice these days. In this research we evaluated the effect of the fetal nerve cell transplantation on the rat survival after the case of clinical death from the mechanical asphyxia.

Methods: 68 white laboratory rats were divided into two groups: control group of 12-month adult male rats (n=26) and experimental group (n=42, identical age and sex). A four-minute clinical death from the acute mechanical asphyxia was stimulated by applying the method of N.Shim. Reanimation was performed using external cardiac massage and artificial respiration. Embryos were taken from female rats on 15-17 weeks of gestation. Cerebral cortex was isolated, reduced to fragments size of 1 mm^3 and mixed with 0.1 ml Hanks solution. Then after doubly resuspension the mixture of cells was injected intraperitoneally in a dose of 1mm^3 per 25g at the time of the cardiac activity restoration. Lactate dehydrogenase (LDH) and creatine phosphokinase (CPK) levels were determined in the homogenate of cerebral cortex of reanimated animals. We recorded the survival rate during the post-reanimation period and studied the integrative brain functions according to the following tests: anxiety-phobic status and latent inhibition.

Results: According to the results transplantation of fetal nerve cells improved the spectral composition of phospholipids in brain of reanimated rats. The enzymatic reactions became to normal with a significant decrease in LDH and increase in CPK level comparatively with the control group. It was revealed that in the control series 10 animals died and 16 stayed alive (62% survival rate) during the first 7 days. Thus, transplantation of the fetal nerve cells increased the survival rate by 20%. Moreover, it was noticed that animals in the control group died in the early stages of the recovery period. In comparison, there were no cases of death in the experimental group during the first two days after the reanimation. As a result of transplantation the level of anxiety in the experimental group was less than in rats of the control group. Also cell therapy improved the reflex reaction in the experimental animals. Nevertheless mechanism of impact of the fetal nerve cells on the dynamic of early post-reanimation period in rats is still not clear and requires further researches.

Conclusions: The study revealed positive effect of the fetal nerve cells on the recovery in early post-reanimation period. This was confirmed by the normalization of enzymes reactions and increase in the survival rate of the resuscitated animals.