

Enhancement of Re-Closure Capacity by the Intra-Amniotic Injection of Human Embryonic Stem Cells in Surgically Induced Spinal Open Neural Tube Defects in Chick Embryos

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To evaluate the potential of the stem cell therapy as a method for prenatal management of spinal open neural tube defect (ONTD), the influence of embryonic stem cells injected into the amniotic cavity on the re-closure capacity of spinal ONTD was investigated. Spinal neural tube was incised open for a length of 6 somites using chick embryos of Hamburger and Hamilton stage 18 or 19. Embryos were divided into three groups: control group (no injection), vehicle group (injection of glucose in PBS), human embryonic stem (hES) cell group [injection of 20,000 hES cells with green fluorescence protein (GFP) in vehicle]. On 3, 5, and 7 days after neural tube incision and immediate intra-amniotic injection, ONTDs were significantly more re-closed in the hES cell group than in the control and vehicle groups. On light and fluorescence microscopic examinations, hES cells were not found in the re-closed area but were present at the area on the process of re-closure, covering ONTDs. In conclusion, intra-amniotic injection of hES cells enhances re-closure capacity of surgically induced ONTDs in chick embryos. The hES cells do not incorporate themselves into the neural tube but do help re-closure.

Key words) *Human embryonic stem cell, Chick embryo, Re-closure capacity, Open neural tube defect*