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J Cell Sci Ther 2016, 7:1 (Suppl)
http://dx.doi.org/10.4172/2157-7013.C1.036

6th World Congress on

Cell & Stem Cell Research

February 29-March 02, 2016 Philadelphia, USA

Novel neural stem cells of the adult mammalian brain

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Neural stem cell niches have been located in different regions of the mammalian brain. Recent studies indicate that ependymal cells, a single layered membrane that lines the ventricles of the brain and central canal of the spinal cord are neural stem cells that give rise to new neurons in the adult nervous system. In this work, we present evidence that supraependymal cells constitute a novel population of rapidly proliferating cell type that generates neurons. In this study, twelve Wistar rats (150-200 g) were divided into three equal groups. Group-1 was used as normal control. Group-2 and 3 were used for unilateral cervical sympathectomy and as sham control respectively. At seven and fifteen days following unilateral sympathectomy and sham operation under deep anesthesia, animals were perfused transcardially and the brains were dissected out and the floors of the third ventricles were processed for scanning microscopy. Scanning electron microscopic studies showed that after unilateral cervical sympathectomy, there was a profound increase in the number of supraependymal neurons on the infundibular floor of the third ventricle as compared to the sham operated animals. This increase following unilateral cervical sympathectomy was much larger at fifteen days as compared to that observed after seven days. In conclusion, supraependymal cells of the ventricular floor may represent a novel niche of neural stem cells in the adult mammalian brain that proliferate and differentiate in response to changes in sympathetic activity. Further studies are necessary to understand the molecular and cellular mechanisms of proliferation and differentiation of supraependymal cells.

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Neuroregeneration induced by autologous mesenchymal stem cells in cerebral palsy patients

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Background: Stem cell-based therapies provide hope for various CNS diseases including perinatal hypoxic ischemic insults of the brain. Stem cells have the capacity to proliferate in culture, migrate and disseminate following implantation within the adult CNS. The neuroregenerative potential of bone marrow derived mesenchymal stem cells (MSCs) is proposed to be through paracrine effect, stimulation of endogenous stem cells, angiogenesis, in addition to the disputed possibility of direct trans-differentiation.

Objectives: To study the impact of MSC transplantation on psychomotor functions in patients with cerebral palsy.

Methods: Fifty two Egyptian patients with cerebral palsy were divided into: Group I (26 patients who underwent autologous intrathecal bone marrow-derived mesenchymal stem cell injection) and Group II (26 patients who served as control). Both groups were assessed, initially and after one year, by a group of clinical scales to assess motor, communication and independence skills.

Results: In Group I, using Boyd's developmental progress scale revealed a statistically highly significant improvement in motor, independence and communication skills after SCT (P value<0.01). Also, 100 points scale revealed a statistically significant improvement after SCT (P value<0.05).

Conclusion: Autologous stem cell transplantation could be a useful tool for the management of patients with cerebral palsy as it may help in improvement of motor, independence and communication skills.

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