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Immunopathological Characteristics of Cerebral Ischemia in Rat Model

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Abstract

Transplanted cells migrated to various parts of the brain and ischemic brain injury by Middle Cerebral Artery Occlusion (MCAO) increased their migration to the injured cortex. Intracerebral grafting of mESCs mostly improve sensory and motor nervous system of physical default in focal cerebral rats. These data indicate that transplanted mESCs survive, dislocate and develop in the infarction condition and decrease neurological injury after focal ischemia in rats. Therefore, we anticipate that transplantation of mESCs could suggest a strong grafting therapy for various neurological injury and degenerative diseases.

Keywords: Middle cerebral artery occlusion; Ischemia; Mouse embryonic stem cell

Introduction

The mechanisms of various ischemic vascular diseases induced by the nervous system have been studied, and the importance of such neuronal diseases has been highlighted in relation to the neuronal cell death due to ischemic brain disease [1]. This research was carried out to prove the effectiveness of stem cells on cerebral infarction and various neurological diseases. In this study, stromal cells were transplanted into MCAO-induced brain tissues for TTC staining. We report the results of histological brain injury sites [2].

Materials and Methods

Cerebral ischemia rats (270 to 300 g) were anesthetized in a sealed chamber using 5% isoflurane. A 3 to 4 mm incision was made in the scalp 1.0 mm lateral to the bregma. Administration of 10 µl solution by the adenovirus infected cell suspension (1x106 cells) was slowly inserted over 20 min into the lateral ventricle at a depth 3.0 mm by using a 10 µl Hamilton micro syringe (Hamilton, Reno, NV) [3-5]. Immunocytochemical staining was used for characterization of differentiated mESCs. mESCs were cultured on cover slips, and induced to neural differentiation.

Experimental Results

Examination of sections stained with GFAP indicated that there was significant gliosis or infiltration of leukocytes around the implantation site of mESCs (Figure 1). Implanted mESCs inter-grafted and migrated to several regions of the brain including the contralateral cortex. The cells grafted in the injured region to which they migrated during 15 days after implantation.

Conclusion

We postulated that grafted stem cells integrate into the cerebral damaged tissue and make

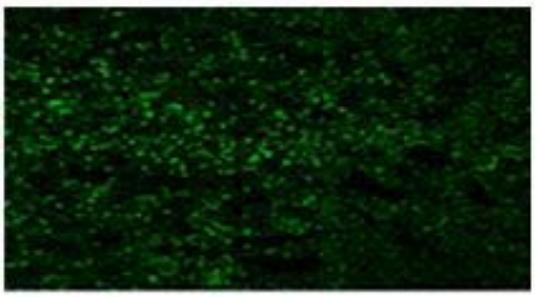

Figure 1: BrdU-positive cells expressed the GFAP protein characteristics of astrocytes (X-400 Magnification).

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appropriate connections within days after transplantation in a various type of neurons like glial cells. Neurotrophic factors could participate in mESC-mediated functional improvement. Growth factors and neurotrophic factors play an important role for neuronal survival cells in an acute inflammation condition and they could support a favorable environment in proliferation or cellular differentiation of injured region. Treatment of mESCs grafting may contribute to the clinical application which may approach to helpful method in a repair of severe brain ischemic disease.

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