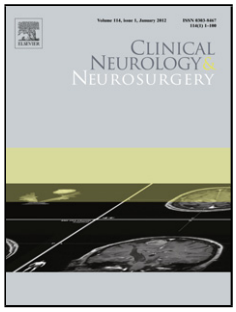

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Neural stem cell therapy - brief review.

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Highlights

- Extraction methods of neural stem cells.
- Description of those methods.
- Therapeutical use of neural stem cells.

Abstract:

Adult mammalian neural stem cells are unique because of their properties, such as differentiation capacity, self-renewal, quiescence, and also because they exist in specific niches, which are the subventricular zone (SVZ) and subgranular zone (SGZ) - the dentate gyrus of the hippocampus. SVZ is situated along the ependymal cell layer, dividing the ventricular area and subventricular zone. There are several sources of neural stem cells such as human embryonic stem cells, human fetal brain-derived neural stem/progenitor cells, human induced pluripotent stem cells, direct reprogrammed astrocytes. Stem cell sciences are a promising tool for research purposes as well as therapy. Induced pluripotent stem cells appear to be very useful for human neuron studies, allowing the creation of defined neuron populations, particularly for neurodevelopmental and neurodegenerative diseases as well as ischemic events.
Neural stem cell sciences have a promising future in terms of stem cell therapy as well as research. There is, however, still a great need for further research to overcome obstacles.
keywords: neural stem cell; NSC therapy; neural stem cell therapy

1. Introduction

Two classes of neural stem cells (NSCs) can be distinguished, notably embryonic stem cells (pluripotent, which create cells from each of the three embryonic germ layers) and adult stem cells (multipotent, which can create lineage-specific cell types). In 1961, Leblond et al. reported that glial cells were dividing throughout the parenchyma [1]. It was in 1965 when Altman and Das presented the first strong evidence for neurogenesis in the adult brain [2], but it was Goldman and Nottebohm, who in 1983 first detected the process of neurogenesis in adult birds [3]. The process of neurogenesis consists of four phases: cell proliferation, migration, cell survival and neuronal differentiation.
Adult mammalian neural stem cells are unique because of their properties such as differentiation capacity, self-renewal, quiescence, and because they exist in specific niches, which are the subventricular zone (SVZ) and subgranular zone (SGZ) - the dentate gyrus of the hippocampus. The SVZ is situated along the ependymal cell layer, dividing the ventricular area and SVZ. Neural stem cells situated in the SVZ are also known as type B cells. Type B cells are extending the basal process and the apical process with a primary cilium that goes through the ependymal cell layer and contacts the cerebrospinal fluid in the ventricle [4]; they give birth to transient amplifying progenitors, called C cells, and thereafter they divide a few times before becoming neuroblasts (A cells). Neuroblasts are migrating radially into the olfactory bulb and they evolve into different subtypes of