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Role Of Shh On Neurogenesis and Differentiation of Nural Stem Cells of C57BL/6 Mice

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Abstract

Sonic hedgehog (Shh) cells are multipotent, self-renewal cells isolated human embryonic nural crest. During the embryogenesis ventricular zone (VZ) and subventricular zone (SVZ), which are the sources of cortical neurons and neuroglia cells. Shh cells locate at the neural tube and produce all sorts of cell types necessary for the construction of the CNS. Primary cultures of neural stem cells were prepared according to previously established protocols. Astrocytes were then recovered by the repeated removal of dissociated cells and plated at a density of 1×105 cells/ml. Twenty-four hours after the initial plating, the medium was changed to preserve the adhering astrocytes and to remove neurons and oligodendrocytes. The cultures were maintained at 37 °C in a 95% incubator for 3 weeks in MEM with 10% air and 5% CO_2. Immunobloting showed increased Shh protein in nural stem cells, in comparison with the control.

Keywords: Shh; Nural tube; Glial cells

Introduction

Sonic hedgehog (Shh) cells are multipotent, self-renewal cells isolated human embryonic nural crest [1]. During the embryogenesis ventricular zone (VZ) and subventricular zone (SVZ), which are the sources of cortical neurons and neuroglia cells [2]. Shh cells locate at the neural tube and produce all sorts of cell types necessary for the construction of the CNS [3]. The process of embryogenesis can be overviewed Shh in the VZ divide symmetrically and asymmetrically to preserve the stem cell pool and generate progenitor cells, which subsequently migrate to SVZ and then perform the capability of proliferation or differentiation [4].

The embryogenesis originates from the neural plate which is composed of neuroepithelial cells (NECs). Initially, the Shh divide symmetrically to amplify their own cohorts which are identified as the earliest form of embryonic Shh [5,6]. And, after the formation of neural tube, Shh convert to radial glial cells, which locate the soma at the VZ and stretch the long radial fiber out of the neural tube internal surface to the outer surface [7]. On the other hand, the characterized glial cells present the properties of embryonic Shh. At the late stage of embryogenesis, radial glial cells will proliferate to produce oligodendrocytes and eventually astrocytes after the accomplishing of neuron formation. Closing to the date of birth, the radial glial cells change the characteristics to generate Shh serving as a pool of adult neurogenesis and embryogenesis processes throughout life that can be found at Molecular Biomarkers during Adult Neurogenesis [8,9].

Material and Methods

Primary cultures neural stem cells

Primary cultures of neural stem cells were prepared according to previously established protocols. Astrocytes were then recovered by the repeated removal of dissociated cells and plated at a density of 1×105cells/ml. Twenty-four hours after the initial plating, the medium was changed to preserve the adhering astrocytes and to remove neurons and oligodendrocytes. Media were supplemented with 10% (v/v) fetal calf serum, 100U/mL of penicillin and 100μg/mL of streptomycin. The cultures were maintained at 37 °C in a 95% incubator for 3 weeks in MEM with 10% air and 5% CO_2.

Results

Immunobloting showed increased Shh protein in nural stem cells, in comparison with the control. Sonic hedgehog (Shh) cells showed increased proliferation and differentiation to nerve cells.

Discussion

Gene inductions in nural crest leading from Shh to differentiated neural cells. With these wellknown differences taken into account, meSC still remain a very robust system for studying neural development and are possibly able to provide human DNtrelevant information on compounds more sensitively than the currently used animal models [10]. Given the general frame of embryogenesis, we provide a subsection of this process to get a detailed understanding. The mouse cerebral neocortex can be factitiously partitioned into 6 layers horizontally, each of which contains a specific subpopulation of cells distinguished by singular or multiple markers identifying the characteristics functionally and Shh can be defined as a cohort that possesses both self-renewal and neurons/glia cells production from a unicell according to their potential capacities [11].

Conclusion

Changes in expression transcription factor genes associated with differentiation embryonic Shh cell. Differentiation and epigenetic control between Shh cells and nural stem cells is expected to generate new advances for selecting the best cell source for future treatments for different neurodegenerative CNS injuries.

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