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Astrocytes Promote Neural Differentiation from Human Embryonic Stem Cells

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Embryonic stem cells (ES) can self-renew and differentiate into various cell types from the three germ layers *in vitro* and *in vivo*. For induction of certain differentiation, embryoid bodies (EB) are usually formed and cultured as a first step. In this study, we investigated direct method for differentiation into neurons or glial cells derived from human embryonic stem (hES) cells. We aimed to shorten induction time of the differentiation and improve the differentiation efficiency.

hES cells (SNUhES 3) were induced to differentiate into neural cells using co-culture method with astrocytes. hES cells co-cultured with astrocytes formed neuroepithelial structures without EB formation. The neuroepithelial cells were appeared within one to two weeks. It is a shorter time for differentiation induction when we compare the differentiation protocol with EB formation step. The high efficiency of the cell formation which has neural fate could be also shown. The potential of the further differentiation into neurons or glial cells were evaluated by immunocytochemistry. From the formed neuroepithelial cells, we identified mature neurons or glial cells which are expressed neuronal and glial cell markers after further differentiation step with growth factor treatment.

In conclusion, we could show that astrocytes promote the neural differentiation *in vitro* and establish an efficient protocol for direct differentiation into neurons or glial cells derived from hES cells.

This research was supported by a grant (code: SC 1010, 1020) from the Stem Cell Research Center of the 21st Century Frontier Research Program funded by the Ministry of Science and Technology, Republic of Korea.