Human Embryonic Stem Cell Transplantation in Parkinson's Disease (PD) Animal Model: II. *In Vivo* Transplantation in Normal or PD Rat Brain

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This study was to examine whether the *in vitro* differentiated neural cells derived from human embryonic stem (hES, MB03) cells can be survived and expressed tyrosin hydroxylase (TH) in grafted normal or PD rat brain. To differentiate *in vitro* into neural cells, embryoid bodies (EB: for 5 days, without mitogen) were formed from hES cells, neural progenitor cells (neurosphere, for $7 \sim 10$ days, 20 ng/ml of bFGF added N2 medium) were produced from EB, and then finally neurospheres were differentiated into mature neuron cells in N2 medium (without bFGF) for 2 weeks. In normal rat brain, neural progenitor cells or mature neuron cells $(1 \times 10^7 \text{cells/ml})$ were grafted to the striatum of normal rats. After 2 weeks, when the survival of grafted hES cells was examined by immunohistochemical analysis, the neural progenitor cell group indicated higher BrdU, NeuN+, MAP2+ and GFAP+ than mature neuron cell group in grafted sites of normal rats. This result demonstrated that the *in vivo* differentiation of grafted hES cells be increased simultaneously in both of neuronal and glial cell type. Also, neural progenitor cell grafted normal rats expressed more TH pattern than mature neuron cells. Based on this data, as a preliminary test, when the neural progenitor cells were grafted into the striatum of 6-hydroxydopamine lesioned PD rats, we confirmed the cell survival (by double staining of Nissl and NeuN) and TH expression. This result suggested that *in vitro* differentiated neural progenitor cells derived from hES cells are more usable than mature neuron cells for the neural cell grafting in animal model and those grafted cells were survived and expressed TH in normal or PD rat brain.