Docket #: S06-442

Multipotent Neural Stem Cells Derived From Human Embryonic Stem Cells

Stanford scientists have successfully developed the first method for isolating normal, homogeneous, expandable and multipotent neural stem-progenitor cells (NSPCs) from human embryonic stem cells (hESCs), using a defined in vitro method of selection and perpetuation based on their intrinsic properties. The isolated NSPCs demonstrate an unlimited self-renewable capacity with normal characteristics, stable growth rate, differentiation profile and consistent generation of the three principal CNS cell types (neurons, astrocytes and oligodendrocytes), thereby eliminating the need for a lineage-specific treatment. The NSPCs are perpetuated using a single cell dissociation protocol that is critical for the accurate measurement of cell viability, growth rate and potency assays. Consequently, this process qualifies for large-scale production under the current good manufacturing practices and for a reliable quality assurance program for potential use of these cells in a clinical setting.

An experiment with a stroke rat model has demonstrated the potential for these NSPCs as a cellular therapy. The grafted NSPCs readily integrate and differentiate within the damaged area in a rat brain, without overgrowth or tumor formation. Thus, these NSPCs appear well suited for therapy of a range of neurological disorders.

Applications

- Cell therapy of neurological disorders, such as stroke, Parkinson's disease, etc.
- In vitro human cell model to screen for CNS therapeutics

Advantages

- The cells can be expanded in vitro for numerous passages
- Once transplanted, the cells engraft without overgrowth or tumor formation
- Protocol can be executed with serum-free media

Publications

- US patent 8,338,176: Derivation of neural stem cells from embryonic stem cells

Patents

- Published Application: 20090035284
- Published Application: WO2009018587
- Issued: 8,338,176 (USA)

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