Human Neuronal Cells for Therapeutic Uses

Published date: Feb. 1, 2012

Technology description

Embryonic stem (ES) cells from various animal models demonstrate pluripotency, the ability to generate the multiple cell types found in the adult body. ES cells can also proliferate indefinitely in an undifferentiated state in vitro. These properties may allow cells derived from ES cells to replace diseased or injured cells and tissue. While the local milieu may direct some naive ES cells into the appropriate fate for that tissue, the formation of teratomas and other unwanted cell types remains an unsolved problem. Thus, the ability to direct the differentiation of embryonic stem (ES) cells into specific fates may be a necessary condition for their use in transplantation therapy for diseases such as Parkinson’ s.

Using mouse ES cells, this laboratory previously produced a highly enriched population of midbrain neuronal cells that, when transplanted into rat models of Parkinson’ s disease, improved motor function and demonstrated in vivo electrophysiological properties consistent with functioning dopamine neurons. Using a similar culturing strategy, but with conditions specifically modified for human ES cells, these inventors have now produced a highly enriched population of human neuronal cells that exhibit electrical activity and synaptic vesicle release. Another simplified method differentiates ES cells grown as a monolayer into neurons, without going through an embryoid body stage.

Application area

This intellectual property provides methods for producing human neuronal cells in general and dopaminergic cells specifically, the cells themselves, and methods of treating diseases caused by neuronal degeneration.

Institution

NIH - National Institutes of Health

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