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## Transplantation of human trophoblast stem cells to treat Parkinsonian rats and its mechanisms

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An application of novel human Trophoblast Stem (hTS) cells for the treatment of drug-induced Parkinson's disease (PD) in rats. PD is one of the major neurodegenerative diseases that affect over 500,000 people in the United States. Current drug treatments only provide symptomatic relief, but they do not retard disease progression. Transplantation of dopaminergic neurons derived from fetal ventral mesencephalic cells or human embryonic stem cells show great potential in treating PD, but their cell origin and socio-ethical issues limit their use. Thus, sourcing an abundant supply of dopaminergic neurons is critical for a treatment solution. We present hTS cells as a viable alternative cell source for regenerative medicine. hTS cells are isolated from the villous trophoblast of the embryo of ectopic pregnancies. hTS cells have pluripotent characteristics and are distinct from human placenta-derived mesenchymal stem (PDMS) cells. After induction by retinoic acid (RA), hTS cells differentiated into trophoblastic neural stem cells (tNSCs). Transplantation of tNSCs into the striatum of 6-OHDA-induced hemiparkinsonian rats significantly regenerated the nigrostriatal pathway anatomically and improved behavioral deficits functionally. We have mapped the molecular pathways to describe how RA induces (1) TH expression, a dopamine precursor; (2) Nanog expression, a pluripotent stem cell factor; and (3) GSK3-beta expression, which prevents entrance of NFAT1, a factor in producing immune response, into the nucleus; thus, allowing tNSCs to have immune privilege. hTS is a promising stem cell platform for translational research and an abundant alternative cell source for regenerative medicine.

### Biography

Jau-Nan Lee completed his M.B. from Kaohsiung Medical University, Taiwan in 1969, M.D. from National Tohoku University, Japan in 1977, and Ph.D. from University of London, England in 1982. He is currently a senior professor and well-known physician scientist, involved in many academic and clinical studies and has published over 100 papers in the fields of obstetrics and gynecology, reproduction, fertility, sterility, menopause, stem cell biology, and regenerative medicine. Dr. Lee has been issued 2 patents by the USPTO for the discovery of hTS cells and its use thereof. Two further patents are pending.