Cell therapeutic approaches with improved intrinsic therapeutic capacity of donor NSCs and extrinsic host brain environments in Parkinson's disease

Sang-Hun Lee, MD., PhD.

Department of Biochemistry & Molecular Biology, College of Medicine, Hanyang University, Seoul 133-791, Korea

Transplantation of neural stem/progenitor cells (NSCs) cultured is potentially a future therapy to treat neurodegenerative disorders, but has faced many challenges with limited success reported so far. A major reason is that the original properties of NSCs associated with their therapeutic capacities, are inevitably altered during in vitro culturing. In the first part of this presentation, I will show our recent data demonstrating that the culture-dependent NSC property changes were substantially rescued by forced expression of the RNA-binding protein Lin28a, and thus behavioral recovery was remarkably improved by transplanting Parkinson's disease (PD) rats with VM-NSCs expanded with Lin28a expression. In addition to the strategies to manipulate intrinsic donor cell properties, correction of host brain environment is also important to attain successful cell therapeutic outcomes, as the host brain becomes hostile to grafted cells after transplantation due to immunogenic and inflammatory reactions induced by mechanical injury of transplantation and transplanted cells, which interfere with enriched neuron engraftment and function. Astrocytes are regarded as a cell type that can modify hostile brain environments based on their neurotropic roles in the developing and adult brain. The second part of this presentation will describe our results addressing correction of host brain environments co-grafting astrocytes in PD.

* This work was supported by grant from the Medical Research Center (2017R1A5A2015395) and NRF-2017R1A2B2002220, funded by the National Research Foundation of Korea (NRF) of the Ministry of Science, ICT and Future Planning, Republic of Korea.