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from Medications and Functional Neurosurgeries to gene therapies and cell transplantations

Investigation of Pathophysiology of Parkinson's Disease Using iPS Cells Technology

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The induced pluripotent stem cells (iPS cells) technology is expected to fill the gaps in modeling of pathophysiology of human neurological diseases by creating a novel approach known as “disease in a dish”. We investigated the pathophysiology of Parkinson's disease (PD), which involves degeneration of the dopaminergic neurons within the substantia nigra, followed by other degenerative changes throughout the brain. Some of the PDs are caused familiarly by genetic mutations, although more than 90% of PD cases are sporadic. However, the dysfunctions of mitochondria and abnormal alpha-synuclein accumulation as well as Lewy Body (LB) formation could be the common mechanisms of familial and spo-

radic PDs. We generated iPS cells from several familial PD patients and showed pathological changes in PD iPS cells-derived neurons in comparison with the postmortem brain of the same patient. The familial PD iPSC-derived neurons showed abnormal metabolism and impaired mitochondrial homeostasis. The obtained phenotypes not only revealed mechanistic insights into familial PD onset but also provide novel targets for drug screenings and modifying therapies for PD.

※ Author's disclosure of potential Conflicts of Interest (COI).

Hideyuki Okano: Patent royalty, Takeda, Ajinomoto and Lion.