# cGMP Methodology and Clinical Trial Preparations for Cell Therapy using Autologous iPSCs for Parkinson's Disease

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Dr. Isacson and the Neuroregeneration Research Institute (NRI) at McLean Hospital are at the forefront of research into regenerative medicine for brain disorders. We are dedicated to discovering better treatments for patients with Parkinson's and Alzheimer's disease and dementia. The NRI's expertise spans a full spectrum of approaches from preventive molecular treatments to restorative cell-based therapies.

Whilst Parkinson's disease (PD) patients benefit from pharmacological substitution of dopamine (DA) that is missing in the part of the brain that controls and initiates motor function, the benefits are transient and eventually result in loss of these effects and additional side effects, such as abnormal movements. We believe a better solution is the one-time cell replacement by autologous dopamine neurons derived from induced pluripotent stem cells (iPSCs) (Figure 1), which will provide substantial clinical benefit long term over decades.

Recently, some teams have approached this type of cell therapy for PD primarily as allogeneic sources for the DA neurons (fetal or embryonic stem cells). For medical and scientific reasons, we consider the cells with the identical makeup (autologous to the patient) will work better than allogeneic. Specifically, there is a lack of immune response to the implanted autologous cells and therefore the patients will not require immune suppression. Moreover, biological studies indicate that the autologous cells integrate better than allogeneic do. The DA neuron differentiation method we have invented is protected by patents and has been shown to work in IND-enabling studies as well as in prior primate studies (Figure 2). Currently, our IND-enabling studies have been completed (Figure 3) and we look forward to receiving IND approval to initiate an NIH funded study in 6 patients at Mass General Brigham (MGB).

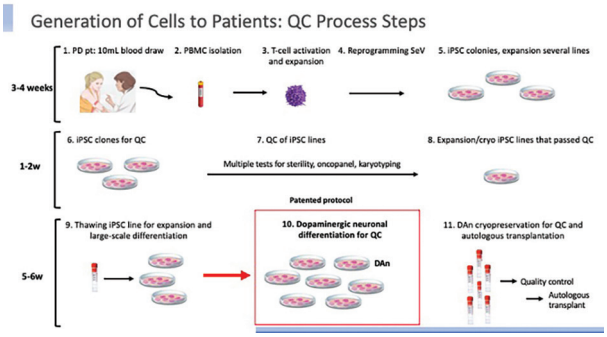


Figure 1. Generation of autologous cells for transplantation.

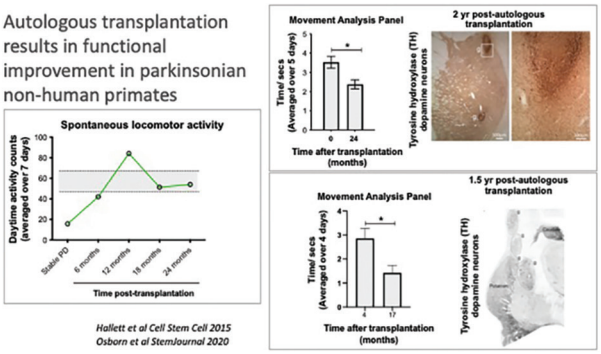


Figure 2. Autologous transplantation results in functional improvement and robust survival of dopamine neurons in parkinsonian non-human primates.

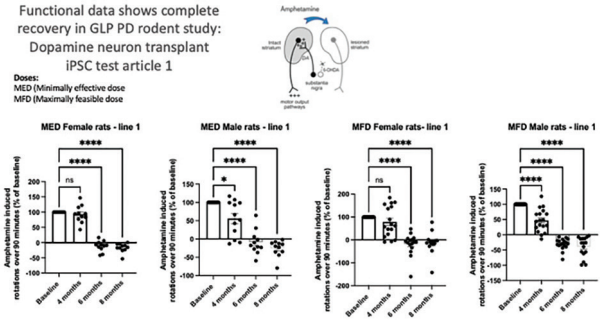


Figure 3. Functional data shows complete recovery in GLP Parkinson's disease model rodent study.