Cell Line Resources from Parkinson’s Progression Marker’s Initiative (PPMI) Participants

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Introduction

The Parkinson’s Progression Markers Initiative (PPMI) is a longitudinal observational study conducted at over thirty international sites that collects data and biospecimens from idiopathic Parkinson’s patients, age- and gender-matched controls, and participants with risk factors for Parkinson’s disease (PD), such as genetic mutations, hyposmia, and REM Sleep Behavior Disorder (RBD), for a minimum of five years. PPMI makes these data and biospecimens rapidly available to qualified investigators to enable biomarker research. In addition to blood products, nucleic acids, urine, and cerebrospinal fluid (CSF), PPMI is also committed to obtaining and distributing a range of cell lines, including uniformly collected fibroblasts and induced pluripotent stem cells (iPSCs), from these well-characterized participants to be used for biomarker research, therapeutic development, drug screening, and disease modeling. PPMI includes these collections as part of two separate Golub Lab iPSC sub-studies, described below.

Study 1: Development of Fibroblasts and iPSCs with NYSCF, RUCDR, & WiCell

The first study, beginning in 2014, is a PPMI collaboration with the New York Stem Cell Foundation (NYSCF), WiCell, Rutgers University Cell and DNA Repository (RUCDR), and Indiana University to generate, characterize, bank, and distribute fibroblasts and iPSCs from skin biopsies.

Skin biopsies were collected from 20 idiopathic PD patients and 5 controls from one U.S. site. NYSCF generated fibroblasts and iPSCs from the skin biopsy samples. Expansion, quality control, and characterization were performed by RUCDR and WiCell. Lines were transferred to Indiana University for banking in the PPMI biorepository for distribution.

Study 2: Development of iPSCs with Cellular Dynamics International (CDI)

The second study was initiated in 2016 to expand the iPSC offerings through a collaboration with Cellular Dynamics International (CDI) and Indiana University. This second study used a blood-based collection protocol to obtain peripheral blood mononuclear cells (PBMCs) from 137 PPMI participants at ten international sites. Participants in this study include healthy volunteers, participants diagnosed with idiopathic PD, participants with clinical risk factors for PD (hyposmia and RBD), and participants with and without PD who have genetic risk factors for PD (GBA1, LRRK2, and SNCA mutations). Of note, each patient enrolled for PBMC collection and iPSC generation also had corresponding contributing imaging, clinical, and biosample data to PPMI.

PBMCs from patients enrolled in this sub-study were reprogrammed into iPSCs by CDI (n=3 clones per patient) and deposited at the Indiana University biorepository for access through PPMI. The breakdown of available iPSC lines from each patient cohort is listed in Table 1. Lines were generated through quality control testing at CDI by karyotype analysis, identity confirmation (genotyping for 38 SNPs), pluripotency markers (gene expression of 48 mRNAs), and mycoplasma testing. All 137 lines are now available for request by qualified researchers through the PPMI biospecimen request process (more information in the Summary section).

Moving forward, MJFF is committed to continued investment for the PPMI iPSCs to generate isogenic control lines for the Genetic PD and Genetic Unaffected lines, as well as differentiating these iPSCs into various cell types, including dopamine neurons and glial cells.

Additional PPMI/MJFF Resources

Additional data and biologic samples are available within the PPMI cohort for biomarker validation/verification. A description of the PPMI study population, clinical data, biologic sample availability, and additional data are in Table 2.

For more information please visit:
- www.ppmi-info.org for information on the PPMI study as well as availability of PPMI data and biospecimens.
- www.michaeljfox.org/biospecimens for information on biospecimen availability for PPMI and additional cohorts.
- www.michaeljfox.org/data for information on data availability for PPMI and additional cohorts.

Summary and More Information

Fig 1. Example of the characterization performed by WiCell on the iPSC lines. Data presented is for the PPMI001 cell line and includes karyotype analysis by G-Band and assessment of marker status of the undifferentiated status of the cell line by flow cytometry. Additional analyses include: reverse STR (identity), identity testing, and mycoplasma testing.