

FHS Induced Pluripotent Stem Cell (iPSC) Resources

NHLBI Next Generation Genetic Association Studies (Next Gen) Collection

This collection, from Dr. Chad Cowan (formerly at the Harvard Stem Cell Institute), was generated to use induced pluripotent stem cells to study cellular pathophysiology and understand the consequences of identified genomic variants.

The Framingham Heart Study (FHS) participants from whom the iPSC lines are derived has contributed extensive knowledge about the epidemiology of hypertensive and arteriosclerotic cardiovascular disease. These cell lines may be useful in studying cardiovascular disease.

Peripheral blood mononuclear cells from [34 FHS participants](#) (from Offspring cohort, Exam 9 or Omni I cohort, Exam 4) were reprogrammed into iPSC lines. Upon initial deposit of this collection, 17 participants were homozygous for the major haplotype at the 1p13 locus and 17 participants were homozygous for the minor haplotype at the 1p13 locus. Two clones from each donor were further expanded resulting in a total of 68 iPSC lines. The focus of deriving these cell lines was to differentiate iPSC lines into hepatocytes and adipocytes to investigate the effect of the 1p13 rs12740374 variant on cardiometabolic disease phenotypes via transcriptomics and metabolomics signatures. The age of donors ranges from 51-90 years. To protect donor identity, an age range rather than exact age is provided.

Please see [Table S1](#) from the [publication](#) describing this collection of cell lines for additional information on these cell lines including:

- 1p13 Genotype
- Average Adipocyte Differentiation Efficiency
- Average Hepatocyte-like Cells (HLC) Differentiation Efficiency

Accessing FHS iPSC lines

The FHS has partnered with Boston Medical Center and Boston University's Center for Regenerative Medicine (CReM) to make FHS iPSC lines available to investigators. The CReM is a premier stem cell, developmental biology and regenerative medicine research center. The CReM and CReM iPSC Core maintain a state-of-the-art bank of frozen iPSC lines that have been derived by CReM investigators and made readily available to all Boston University and external investigators. Please see [CReM](#) for details on the iPSC Core and available FHS iPSC lines. This set of 68 iPSC lines created under the Next Gen initiative are also available through WiCell, another recognized world leader in pluripotent stem cell banking and characterization. Please see [WiCell](#) for more information on ordering FHS iPSC lines there. Additional FHS iPSC lines, apart from the Next Gen initiative, have been created and are maintained at the CReM.

In order to receive FHS iPSC lines from the CReM or from WiCell, a research application must be submitted to and approved by the FHS. You can begin your [FHS Research Application here](#).

PBMCS

FHS also has cryopreserved PBMCS (Peripheral Blood Mononuclear Cells) collected from 5908 Offspring exam 9, Omni1 exam 4, Gen 3 exam 3 and Omni2 exam 3 cohorts that are available for iPSC creation with an approved FHS research application. To assist in the selection of PBMCS for iPSC creation, below are tables with key demographic information of the participants at the time of PBMC collection as well as the availability of OMICS data in these participants.

Table 1. Key demographics on available FHS participant PBMC samples *

VARIABLE	OFFSPRING	NOS	GEN3	OMNI1	OMNI2
TOTAL N*	2258	51	3031	289	279
FROM EXAM	9	3	3	4	3
MEAN AGE AT DRAW	70.52	73.71	54.17	66.04	53.94
MIN AGE AT DRAW	46	60	32	44	32
MAX AGE AT DRAW	96	93	83	88	89
% FEMALE	54.52	50.98	53.38	59.17	55.2
% HISPANIC	0.22	1.96	0.23	35.29	41.94
RACE GROUP	%	%	%	%	%
American Indian or Alaska Native	0.58	-	0.63	0.35	0.36
Asian Indian or Pacific Islander	-	-	-	1.73	-
ASIAN	0.09	-	0.13	23.53	26.52
BLACK	0.22	-	0.10	37.72	25.45
CAUCASIAN	98.27	98.04	98.71	1.38	2.15
HISPANIC	0.22	1.96	0.23	35.29	41.94
Native Hawaiian or Other Pacific	-	-	-	-	0.72
NOTGIVEN	0.62	-	0.20	-	2.87

Table 2. Availability of OMICS data in FHS participants with PBMC samples*

FHS OMICS DATA	N
TOPMed METABOLOMICS	5479
TOPMed METHYLATION	5452
TOPMed PROTEOMICS	4732
TOPMed RNASEQ	4527
TOPMed WGS	4937
EXPRESSION DATA	4485
APOE GENOTYPE	5657
GWAS DATA	4969

*the information may not be fully up to date as some samples may be have been used