The Human Pancreas Analysis Program (HPAP) Data Repository

HPAP Website: https://hpap.pmacs.upenn.edu

Nilanjana Samanta[1], Jake Bergren[1], Paul Kopec[1], Jason H. Moore[1], Klaus H. Kaestner[2], and Ali Naji[3]

[1]Institute for Biomedical Informatics, Perelman School of Medicine, University of Pennsylvania, Philadelphia, PA, USA
[2]Department of Genetics, Perelman School of Medicine, University of Pennsylvania, Philadelphia, PA, USA
[3]Department of Surgery, Perelman School of Medicine, University of Pennsylvania, Philadelphia, PA, USA

ABSTRACT

The Human Pancreas Analysis Program (HPAP) consortium performs deep phenotyping of the human endocrine pancreas and its interaction with the immune system, to better understand the cellular and molecular events that precede and lead to the beta cell loss in Type-1 Diabetes (T1D). The HPAP database (https://hpap.pmacs.upenn.edu/) requires registration for access to data and is available to all HIRN members and the T1D research community as a whole.

The database includes a wide variety of biomedical data in a multitude of formats arranged strategically. These features enable users to make informed decisions before downloading data files for analysis.

HOW TO REGISTER

1. Registration is required only when you wish to download data. You do not need to register to navigate or view data present in the HPAP database.
2. Visit https://hpap.pmacs.upenn.edu for the HPAP website.
3. Go to the "Register" tab on top right corner of the website and type in the asked details. All fields are required.
4. Carefully go through the data user agreement before submitting the registration form.
5. Please make sure to check the inbox or spam/junk folder of registered email for a verification link (email subject- "HPAP Account Verification").
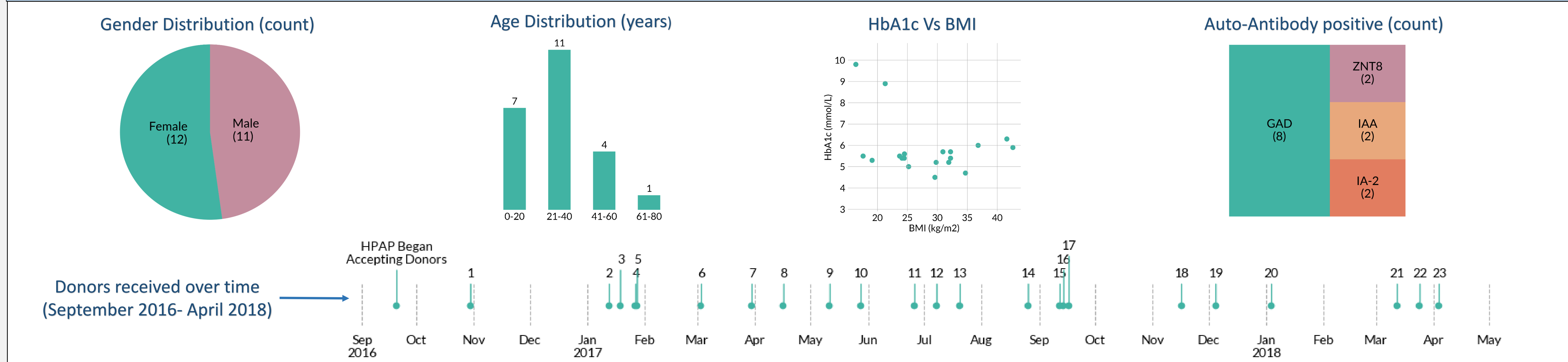
6. **Website QR code:**

DATA AVAILABLE

1. Documentation of workflow
2. Standard Operating Protocols
3. Donor characteristics (Clinical Data)
4. Tissue histology images
5. Molecular phenotyping of whole and dispersed islets
   a. ATAC-seq
   b. Single-cell RNA-seq
   c. Sorted alpha and beta cell RNA-seq
   d. Whole genome methylation analysis
6. Islet physiology analysis of whole and dispersed islets
   a. Morphology and Viability
   b. Perifusion to measure hormone secretion
   c. Calcium imaging
   d. Oxygen consumption
   e. Electrophysiology (patch clamp)
7. B and T Immune cell characterization by Flow cytometry (5 panels with focus on: Immune Lineage, B cells, CD4 T cells, CD8 T cells and Cytokines)
   a. Spleen
   b. Peripheral blood
   c. Pancreatic lymph nodes
8. Immune repertoire analysis
   a. Single cell sequencing (paired VH/VL or Va/Vb)
      1. Unsorted
      2. Sorted subsets
      3. Antigen-specific
   b. Bulk sequencing (VH and/or Vb)
      1. Spleen
      2. Peripheral blood
      3. Pancreatic lymph nodes
9. Imaging mass cytometry (with 33 distinct antibodies)
10. Splenic Treg cell isolation and Treg suppressive function assay

FUTURE ENHANCEMENTS

Specialized viewers to better visualize some of the data in HPAP Database. Such as-
1. ATAC sequence gene viewer
2. Histology image viewer
3. Imaging mass cytometry viewer
4. Islet perifusion viewer

CURRENT DONOR DEMOGRAPHICS

Gender Distribution (count): Female (12), Male (11)

Age Distribution (years): 0-20: 7, 21-40: 11, 41-60: 4, 61-80: 1

HbA1c Vs BMI

Auto-Antibody positive (count): GAD (8), ZNT8 (2), IAA (2), IA-2 (2)

Donors received over time (September 2016 - April 2018)

CURRENT FEATURES

1. The database enables users to navigate through the complex dataset in a strategic manner using filters for donor attributes.

2. It also features "donor snapshots" that provide a quick view of underlying data by displaying a summary of important information, including but not limited to demographics.

3. To view more detailed information on a donor, users can access the additional-information page associated with that donor.

You can compare these data points across all donors by selecting the "Next donor" option

4. Downloads are navigated using a simple-to-use folder structure that allows for a multiple-donor data selection

5. The database allows users to view workflows and download all data files and standard operating protocols produced by the HPAP effort.