Editorial

Understanding the human immune system in the 21st century: The Human Immunology Project Consortium

While tremendous advances in the immunological diagnosis, prevention, and treatment of myriad diseases have already occurred, much remains to be learned and applied. In the area of infectious diseases alone, huge scientific gaps remain in understanding the immune system's response to antigens, and in using that knowledge to design vaccines and other immune therapies. In order to advance this science and fill these gaps, the Human Immunology Project Consortium (HIPC) was formed by the NIAID Division of Allergy, Immunology, and Transplantation as part of an overall focus on human immunology. An important goal in the design of the HIPC program is to create a centralized database that includes research resources and scientific data on human immune responses for the greater scientific community to use.

The major HIPC goals include the following:

1. Defining profiles/signatures/fingerprints of the steady-state and activated human immune system.
2. Creating a centralized knowledge base and resources to facilitate investigations of human immunity.
3. Developing novel applications for human disease.

These goals will be achieved by groups involved in studying perturbations of the immune system steady-state by infection, vaccination, and adjuvant administration. As much of this work involves deciphering systems level phenomena, HIPC scientists are using sophisticated bioinformatics approaches to define the human transcriptome/proteome. Additional study methods include multiplex assays, multiparameter phenotyping, systems biology approaches and mass spectrometry.

The information gained from the HIPC program is intended to provide a comprehensive understanding of the human immune system and its regulation, and will reveal novel associations between components of the immune system and other biological systems, identify novel immune mediators and pathways, establish predictors of vaccine efficacy and safety in different populations, and enable the rapid evaluation of different vaccine formulations and administration regimens in human populations. This knowledge base will also serve as a foundation for the study of immune-mediated diseases in humans, such as allergy, asthma, transplant rejection, autoimmune diseases, and a variety of inflammatory diseases.

The funded HIPC sites include the following institutions:

- Dana-Farber Cancer Institute (http://bio.dfci.harvard.edu/research/core-facilities.php) PI: Ellis Reinherz, MD – “Cross-protective CTL Against Influenza”.
- Seattle Biomedical Research Institute (http://www.immuneprofiling.org/hipc/page/showPage?pg=facilities-seattlebio) PI: Kenneth Stuart, PhD – “Immune Profile and Network Analysis of Malaria Infection and Vaccination”.
- Baylor Research Institute (http://www.baylorhealth.edu/Research/InstitutesCenters/BIRR/Pages/default.aspx) PI: A. Karolina Palucka, MD – “Systems Analysis of Vaccine Responses in Healthy and Hyposresponsive Humans”.
- Stanford University (http://iti.stanford.edu/research/vaccination_u19.html) PI: Mark Davis, PhD – “Vaccination and Infection: Indicators of Immunological Health and Responsiveness”.

In addition, the HIPC has established a Scientific Advisory Board (SAB) to provide advice to the NIAID on the progress of scientific studies, to identify gaps within the program, and to review and recommend new opportunities that will contribute to fulfillment of the HIPC mission. SAB members attend the semi-annual investigator meetings to review and discuss HIPC progress and deliverables with the HIPC Steering Committee and with NIAID program staff. Current members of the SAB include:

- Peter Ghazal – University of Edinburgh (UK)
- Barney Graham – NIH/NIAID (Bethesda, MD, USA)
- Adrian Hayday – King’s College London (UK)
- Richard Koup – NIH/NIAID (Bethesda, MD, USA)
- Jonathan McCullers – St. Jude Children’s Research Hospital (Mephis, TN, USA)
- Dennis Metzger – Albany Medical College (Albany, NY, USA)
- Eleanor Riley – London School of Hygiene and Tropical Medicine (UK)
- Joachim Schultzze – University of Bonn (Bonn, Germany)
- John Treanor – University of Rochester (Rochester, NY, USA)
Unique to the intent and goals of the HIPC is the specific goal to share data as widely and freely as possible in order to promote new research and generate new hypotheses. In addition to individual Center projects, the HIPC program includes an Infrastructure and Opportunities Fund (IOF) supporting pilot projects, as well as shared research infrastructure for ongoing development of the immunology project network. This may include, for example, the development of shared databases, sample repositories, bioinformatics tools, sample sparing assays, centralized laboratory resources, and other collaborative activities. This allows data to be available to HIPC investigators, as well as those outside of the HIPC Centers, for the purposes of data mining, which may happen in 2014. For this reason, a HIPC Data Sharing Plan has been designed to enable the widest dissemination of data, while also protecting the privacy of the participants and the utility of the data, by de-identifying and masking potentially sensitive data elements. This approach is fully compliant with the NIH public data sharing policy (http://grants.nih.gov/grants/policy/data_sharing), and is likely to be extremely valuable to investigators worldwide.

Readers are invited to further peruse the HIPC website (http://www.immuneprofiling.org/hipc/page/show) to learn further details, read about individual projects, see funding opportunities, and to read summaries of past meetings. In addition, publications supported by HIPC funding are listed on this website.