2009 Annual Immune Epitope Database and Discovery Workshop Meeting Report Executive Summary

The Fifth and final Annual Immune Epitope Database and Discovery Workshop was held March 10 and 11, 2009 at the Silver Spring Hilton Hotel in Silver Spring, Maryland. The meeting provided an opportunity for the contractors of the Immune Epitope Database and Analysis Resource (IEDB) and the Large Scale Antibody and T Cell Epitope Discovery programs to present their project status and plans and to discuss common interests.

The two-day meeting started with a presentation of the status of the IEDB. In the past fourteen months, the IEDB has focused on adding epitope data from literature and Epitope Discovery groups, increasing user base and usability, enhancing the Analysis Resource with new and better tools, and improving data consistence and quality. The IEDB ontology development effort led to a complete redesign and implementation of the database (IEDB 2.0) deployed in late January 2009, more semantically accurate and capable of housing more complex data. The curation of infectious disease and allergen peptidic epitopes from the scientific literature was mostly complete and most of the Epitope Discovery contractors had successful deposited their data in the database. A number of new tools and enhancements were made to the Analysis Resource during this time that increased its capabilities and usability.

The IEDB presentation was followed by fourteen 40 minute presentations by the Large-Scale Antibody and T Cell Epitope Discovery contractor teams. Jeffrey Frelinger (University of North Carolina) first described their recent efforts in identifying epitopes from Francisella tularensis SchuS4 using T cell hybridomas and the T cell antigen discovery system. Soren Buus (Univ. of Copenhagen) and Morten Nielsen (Technical University of Denmark) then presented an update of their work developing predictive algorithms for T cell epitope identification and the results of their peptide binding experiments for MHC class I and II. Ole Lund (Technical University of Denmark) discussed their bioinformatics tools and the results they have obtained regarding the development of epitope-based vaccines and diagnostics. The afternoon session started with Tom August and Ernesto Marques (Johns Hopkins University) describing their identification of HLA-restricted T cell epitope determinants of West Nile Virus (WNV), yellow fever virus (YFV), and hepatitis A virus (HAV) proteins by use of HLA transgenic mice and human subject cohorts by means of ELISPOT assays performed with overlapping peptide libraries. This was followed by three talks on Vaccinia virus epitopes. Sebastian Joyce (Vanderbilt University) discussed their work on identifying and characterizing the immunobiology of naturally processed vaccinia virus-derived epitopes presented by the most frequent members of six major HLA class I supertypes. Alex Sette (La Jolla Institute for Allergy and Immunology) described recent efforts to generate an immunomic map of Vaccinia-derived class I and II restricted epitopes by using predictive bioinformatics algorithms and validation with in vitro MHC binding and IFNγ ELISPOT assays, and the insights gained related to immunodominance and protection. Clemencia Pinilla (Torrey Pines Institute for Molecular Studies) completed the Vaccinia talks by reporting on their advances in the identification and validation of novel CD4+ vaccinia T cell epitopes. The day finished with Kim Janda (Scripps Research Institute) providing an update of his group's research in finding protective monoclonal antibodies against botulinum neurotoxins types A, B, and E.

The second day started with a presentation by Daniel Altman (Imperial College London) on the discovery of HLA class II epitopes of Yersinia pestis (plague) and Bacillus anthracis (anthrax), with a particular focus on their recent work with anthrax-infected individuals in Turkey. Eddie James, a postdoc in William Kwok's lab (Benaroya Research Institute at Virginia Mason) next reported on their use of Tetramer Guided Epitope Mapping to identify specific CD4+ T cell epitopes within Influenza, Tetanus toxoid, and Bacillus anthracis antigens. This was followed by Curtis McMurtrey and Angela Wahl, two graduate students of William Hildebrand (University of Oklahoma), discussing their discoveries of host and virus-encoded peptide epitopes unique to Influenza and West Nile Virus. David Lewinsohn (Oregon Health and Sciences University), who is investigating Mycobacterium tuberculosis-specific human CD8 T cell antigens and epitopes, provided an update on the three independent and complementary identification approaches they are using. Kent Weinhold (Duke University) reported that using their DC-based validation platform, immunogenic peptides restricted by the HLA-A*0201 class I allele have been identified for Ebola Zaire nucleoprotein and glycoprotein, Ebola Sudan Gulu glycoprotein, as well as for six proteins from Multidrug-resistant TB. The meeting concluded with Maya Kotturi, (La Jolla Institute for Allergy and Immunology) presenting recent work on identifying conserved class I and II restricted T cell epitopes and developing a vaccine strategy designed to elicit $CD8^+$ and $CD4^+$ T cell responses against 7 pathogenic arenaviruses.

The presentation title and presenters, in the order they presented, are listed below.

Presentation Titles

The Immune Epitope Database and Analysis Resource
Presented by AlessandroSette Ph.D. and Bjoern Peters Ph.D.
La Jolla Institute for Allergy and Immunology

Identification of Epitopes from *F. tularensis*
Presented by Jeffrey Frelinger, Ph.D.
University of North Carolina

Predictive Algorithms for T Cell Epitope Identification
Presented by Soren Buus, M.D., Ph.D. and Morten Nielsen, Ph.D.
University of Copenhagen

Discovery of Epitopes of NIAID Category A-C Pathogens Using Bioinformatics and Immunology
Presented by Ole Lund, Ph.D.
Technical University of Denmark

HLA-Restricted T Cell Epitope Peptides of WNV, YFV, and HAV Identified by Immunization of HLA Transgenic Mice and Analysis of Human Subject Cohorts
Presented by J. Thomas August, M.D. and Ernesto Marquest, M.D., Ph.D.
Johns Hopkins University School of Medicine (JHU).

Display of Naturally Processed Peptides by HLA Class I Molecules: The Discovery of Poxvirus-Derived CTL Epitopes and Self Peptidome Shift in Vaccinia Virus Infected Cells

Presented by Sebastian Joyce, Ph.D.
Vanderbilt University

Identification of Class I and Class II Restricted Epitopes Derived from Variola and Vaccinia Viruses
Presented by Alex Sette, Ph.D.
The La Jolla Institute for Allergy & Immunology

Multi-Functional Analysis and Specificity of Human CD4+ T Cell Responses that Emerge in Responses to Smallpox Vaccination
Presented by Clemencia Pinilla, Ph.D.
Torrey Pines Institute for Molecular Studies,

Botulinum neurotoxins A, B, and E: Investigations Using Human Antibodies for Epitope Mapping and Neutralization
Presented by Kim Janda, Ph. D.
The Scripps Research Institute

Large-Scale T Cell Epitope Discovery: CD4 Epitopes in Anthrax and Plague
Presented by Daniel M. Altmann, Ph.D. and John Robinson, Ph.D.
Imperial College, London and University of Newcastle, UK

Use of Recombinant MHC Class II in Identifying CD4+ T Cell Epitopes, Determining MHC Class II Peptide-Binding Motifs, and Estimating Frequencies of Antigen-Specific CD4+ T Cells in the Naïve T Cell Repertoire
Presented by Eddie James, Ph.D.
Benaroya Research Institute at Virginia Mason

Origin and Immune Targeting of Endogenously Loaded West Nile Virus and Influenza Virus Epitopes
Presented by Curtis McMurtrey and Angela Wahl
University of Oklahoma Health Sciences Center

Mtb-Specific Human CD8 TCells Antigens and Epitopes
Presented by Deborah Lewinsohn, M.D.
Oregon Health and Science University

Identification and Validation of Candidate T Cell Epitopes from Ebola Virus and *Mycobacterium tuberculosis*
Presented by: Kent J. Weinhold, Ph.D.
Duke University Medical Center

Class I and Class II Restricted Epitopes from a Representative Sample of the Different Arenavirus Species Pathogenic in Humans
Presented by Maya Kotturi, Ph.D.
La Jolla Institute for Allergy & Immunology