

KEYSTONE SYMPOSIA

on Molecular and Cellular Biology

Progress and Pathways Toward an Effective HIV Vaccine (J6)

Scientific Organizers: M. Juliana McElrath, Pamela J. Bjorkman and Beatrice H. Hahn

Sponsored by Pfizer Inc.

Part of the Keystone Symposia Global Health Series, supported by the Bill & Melinda Gates Foundation

Emerging Technologies in Vaccine Discovery and Development (J5)

Scientific Organizers: David Kaslow, Nicholas Jackson and Ann L. Lee

January 28-February 1, 2018 • Fairmont Banff Springs • Banff, Alberta, Canada

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Global Health Travel Award Deadline: August 29, 2017 / Abstract & Scholarship Deadline: October 4, 2017 / Abstract Deadline: November 2, 2017 / Discounted Registration Deadline: December 6, 2017

SUNDAY, JANUARY 28

Arrival and Registration

MONDAY, JANUARY 29

Welcome and Keynote Address (J6)

***M. Juliana McElrath**, Fred Hutchinson Cancer Research Center, USA

Michel C. Nussenzweig, HHMI/Rockefeller University, USA
The HIV Vaccine Problem

Welcome and Keynote Address (J5)

***David C. Kaslow**, PATH, USA

Penny M. Heaton, Bill & Melinda Gates Medical Research Institute, USA

Introducing the Gates Medical Research Institute: A Vision for Accelerating Translational Development

Laying the Foundation for an HIV Vaccine (J6)

Dennis R. Burton, The Scripps Research Institute, USA
Neutralizing HIV Antibodies and Protection

Barton F. Haynes, Duke University Medical Center, USA
Host Controls of Broadly Neutralizing Antibodies

***M. Juliana McElrath**, Fred Hutchinson Cancer Research Center, USA

Early Clinical Concepts to Advanced Stage HIV Vaccine Studies

Daniel Stieh, Johnson & Johnson, Netherlands
Short Talk: Interim Immunogenicity Analysis of TRAVERSE: A Randomized, Parallel-Group, Placebo-Controlled, Double-Blind phase 1/2a Study in HIV Uninfected Adults to Assess Safety/Tolerability and Immunogenicity of Two Different Prime/Boost Regimens

Tomas Hanke, University of Oxford, UK
Short Talk: Clinical Development of the First -Generation Conserved Region T Cell Vaccines

New Tools in Antigen/Vaccine Discovery (J5)

***Pamela J. Bjorkman**, California Institute of Technology, USA

Tobias R. Kollmann, University of British Columbia, Canada
Decoding the Human Immune System to Accelerate Vaccine Development

Simon Delagrave, Sanofi Pasteur, USA
Novel Antigen Design and Functional Immune Assessments

Rafick-Pierre Sekaly, Case Western Reserve University, USA
Systems Biology and Vaccine Discovery

Sarah F. Andrews, National Institutes of Health, USA
Short Talk: Single-Cell Characterization of the Recall and de novo Responses in Humans to Influenza Hemagglutinin

Hana Golding, US Food and Drug Administration, USA
Short Talk: Impact of AS03 Adjuvant on Antibody Repertoires and Affinity Maturation Against H5N1 Pandemic Influenza Vaccines and Heterologous Neutralization

Workshop 1: Assessing Immunogenicity in Animals to Predict Outcomes in Humans (J5)

***Richard Malley**, Boston Children's Hospital, USA

Lenny Moise, EpiVax, USA
Immune Engineered H7N9 Influenza Hemagglutinin Overcomes Poor Vaccine Immunogenicity

Clare N. Burn, Albert Einstein College of Medicine, USA
An HSV Vaccine Candidate Deleted in Glycoprotein D Elicits High Titer FcγRIV-Activating Antibodies that Protect against HSV Challenge: A Role for HVEM in Functional Immune Responses

Ian Francis, Boston University, USA
Neisseria Gonorrhoeae Outer Membrane Vesicles Lacking RMP Show Promise as a Vaccine Antigen

Raphael Simon, University of Maryland School of Medicine, USA
Preclinical Development of a Glycoconjugate Vaccine for Sub-Saharan Africa to Prevent Typhoid and Invasive Nontyphoidal Salmonella Disease

Emmanuel Amlabu, University of Ghana, Ghana
Functional Characterization of Plasmodium Falciparum Surface Related Protein (PfSRP) as a Potential Blood-Stage Vaccine Target

Mariette Barbier, West Virginia University, USA
Development of Vaccines against P. Aeruginosa based on Iron Acquisition

Jian-Dong Huang, University of Hong Kong, China
Combination of Multiple Antigens are Essential for the Development of a Novel Vaccine Against Staphylococcus aureus Infection

Structural Immunology Guiding Vaccine Development (Joint)

***Pamela J. Bjorkman**, California Institute of Technology, USA
Structural Studies of Antibody and Receptor Binding to HIV-1 Env

Jason S. McLellan, University of Texas at Austin, USA
Structure-Based Vaccine Design for Class I Viral Fusion Glycoproteins

Andrew B. Ward, The Scripps Research Institute, USA
Using Structures to Guide Env Immunogen Design and Redesign

Walther Mothes, Yale University School of Medicine, USA
Short Talk: Associating HIV-1 Env Trimer Structures with Functional Env Conformational States by smFRET Analysis

Poster Session 1

TUESDAY, JANUARY 30

Germinal Centers, B/T Cell Interactions (J6)

***Shane Crotty**, La Jolla Institute for Allergy and Immunology, USA
Assessing the Engines of Affinity Maturation: Germinal Centers and Tfh Cells

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Gabriel D. Vitoria, Rockefeller University, USA

Clonal and Cellular Dynamics of Germinal Center Selection

Facundo D. Batista, Ragon Institute of MGH, MIT and Harvard, USA

B Cell Activation Induces a Switch from Canonical to Non-Canonical Autophagy that Shapes B Cell Fate

Kimberly M. Cirelli, La Jolla Institute for Allergy and Immunology, USA

Short Talk: Sustained Delivery Immunization Enhances Germinal Center and Antibody Responses to Env in rhesus macaques

Omolara Olujimi Baiyegunhi, University of KwaZulu-Natal, South Africa

Short Talk: Early Initiation of Antiretroviral Therapy during Hyperacute HIV-1 Infection Preserves T Follicular Helper Cell Function

Ben Read, Massachusetts Institute of Technology, USA

Short Talk: Nanoparticle Delivery, Glycosylation and Host Complement Target Env Immunogens to the Germinal Center

New Platforms for Active Immunization (J5)

***Louis J. Picker**, Oregon Health & Science University, USA

Klaus Früh, Oregon Health & Science University, USA

CMV-Vectored Vaccines for Eliciting Cellular Immunity

Justin Moran, Pfizer Inc., USA

Multi-Component Vaccines Are the Future but Pose Development Challenges

Richard Malley, Boston Children's Hospital, USA

Generating Broad B- and T-Cell Immunity via the Multiple Antigen-Presenting System (MAPS)

Christine Shaw, Moderna Therapeutics, USA

Targeting Viral Pathogens with mRNA-Based Vaccines

Tong-Ming Fu, Merck Research Laboratories, USA

Short Talk: A Replication-Defective Human Cytomegalovirus Vaccine for Prevention of Congenital Infection

Nadia Oreshkova, Leiden University Medical Center, Netherlands

Short Talk: Engineering Yellow Fever Virus 17D-based RNA

Replicons into an Innovative DNA-Launched Vaccine Vector Platform

Jean-Philippe Julien, Hospital for Sick Children Research Institute, Canada

Short Talk: Structural Studies of Human Antibody Responses to Malaria Vaccine Antigen PfCSP

Hands-On Computer Session on Los Alamos Sequence Database (J6)

Workshop 1: Laying the Groundwork for Vaccine Design (J6)

***Marie Pancera**, Fred Hutchinson Cancer Research Center, USA

***Michael Farzan**, The Scripps Research Institute, USA

Christopher Andrew Cottrell, The Scripps Research Institute, USA
Using High-Resolution Cryo-Electron Microscopy to Guide Iterative Structure-Based HIV Vaccine Design

Christopher O. Barnes, California Institute of Technology, USA
Structural Characterization of a Highly Potent V3-Targeting Broadly Neutralizing Antibody Bound to Natively-Glycosylated HIV-1 Envelope

Jose Maximiliano Medina-Ramirez, University of Amsterdam, Netherlands

Sequential Vaccination Regimens Based on Multiclade Germline-Targeting Trimers and Affinity Intermediates to Guide bNAB Development

Jason J. Gorman, NIAID, National Institutes of Health, USA

Stabilization of Soluble SIV Envelope Trimers

Wilton B. Williams, Duke University, USA

SHIV-CH848 Infection of Rhesus Macaques Recapitulates HIV-1 Env-Antibody Co-Evolution of Humans

Tara A. Bancroft, Fred Hutchinson Cancer Research Center, USA
Detection and in vivo Activation of Naive B Cells Expressing Putative Germline Precursors of a Neutralizing Antibody using Anti-Idiotypes

Devin Sok, International AIDS Vaccine Initiative, USA
Non-human Primate Pharmacokinetics Evaluation of Broadly Neutralizing Antibodies Isolated from Cow Immunizations

Claudia Cicala, NIAID, National Institutes of Health, USA
Select gp120 V2 Domain Specific Antibodies Derived from HIV and SIV Infection and Vaccination Inhibit gp120 Binding to Integrin $\alpha 4\beta 7$

Workshop 2: Epidemic Preparedness Innovation (J5)

***David C. Kaslow**, PATH, USA

Just-in-Time and Just-in-Case Vaccines Approaches to Epidemic Preparedness

Christine Dahlke, University Medical Center Hamburg-Eppendorf, Germany

Human miRNome Profiling Identifies a MicroRNA Signature Induced by the Ebola Vaccine rVSV-EBOV

Tulika Singh, Duke University, USA

Transplacental Transfer of IgG in the Setting of Zika Virus Infection during Pregnancy

Neal Scott Van Hoeven, Infectious Disease Research Institute, USA
Development of a Flexible Replicating Viral RNA Vaccine Platform and Generation of a Candidate Vaccine for Zika Virus

Emma M. Kennedy, Public Health England, UK
Development of a Vaccine for Lassa Fever using Modified Vaccinia Ankara Virus as a Vector

Nianshuang Wang, University of Texas at Austin, USA
Structure-Based Design of Prefusion Coronavirus Spikes with Enhanced Expression, Stability and Immunogenicity

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Jingjing Jiang, Inovio Pharmaceuticals, USA
Immunogenicity of a Multivalent Mosquito-Borne Virus DNA Vaccine in Non-Human Primates

Model Systems for HIV Vaccine Development (J6)

***George M. Shaw**, University of Pennsylvania, USA
Recapitulation of HIV-1 Envelope-Antibody Coevolution in Rhesus Macaques Leading to Strain-Specific and Broadly Neutralizing Antibodies

Pia Dosenovic, Rockefeller University, USA
Activation of HIV-1-Specific B Cell Precursors in the Presence of a Polyclonal Immune System

Andres Finzi, CRCHUM, Université de Montréal, Canada
Impact of Env Conformation on ADCC Responses

Ann J. Hessel, Oregon Health & Science University, USA
Short Talk: Targeting V1V2 Epitopes for the Development of an Effective HIV Vaccine

New Platforms for Passive Immunization (J5)

***Charles Richter King**, PATH, Malaria Vaccine Initiative, USA

JoAnn A. Suzich, AstraZeneca, USA
Multi-Mechanistic Monoclonal Antibody-Based Approaches for Passive Immunoprophylaxis

Alejandro Balazs, Massachusetts General Hospital, USA
Development of Vectored Immunotherapy Reveals Escapability as a Key Feature of Broadly Neutralizing Antibodies

Amar Kumar Garg, Indian Institute of Science, India
Short Talk: Stochastic Simulation of Affinity Maturation in Germinal Centers Suggest Optimal Passive Immunization Protocols

Steven E. Bosinger, Emory University, USA
Short Talk: BALDR - A Computational Pipeline for Linking Paired Immunoglobulin Heavy and Light Chain to Gene Expression for Single-Cells in Vaccine Studies

Cody S. Nelson, Duke University, USA
Short Talk: HCMV Glycoprotein B Vaccine Efficacy Likely Mediated by Non-Neutralizing Antibody Effector Functions

Poster Session 2

WEDNESDAY, JANUARY 31

New Tools in Interrogating Human Immune Responses (Joint)

***Bette Tina Marie Korber**, Los Alamos National Laboratory, USA
Computational Tools for Antigen Design

Mohammad M. Sajadi, University of Maryland School of Medicine, USA

The Circulating Antibody Repertoire: Tools of the Trade

Louis J. Picker, Oregon Health & Science University, USA
Immune Programming with CMV Vectors

Anna P. Durbin, Johns Hopkins Bloomberg School of Public Health, USA

Characterizing the Cellular and Humoral Response of Human Volunteers following Dengue Vaccination and Challenge in a Dengue Controlled Human Infection Model

Ian Setliff, Vanderbilt Vaccine Center, USA
Short Talk: Identification of Public Antibody Clonotypes in HIV-1 Infection

Hands-On Computer Session on Los Alamos Immunology Database (J6)

Workshop 2: Clinical and Preclinical Vaccine Studies (J6)

***Nancy L. Haigwood**, Oregon Health & Science University, USA

***Alejandro Balazs**, Massachusetts General Hospital, USA

Andrew Jones, Emory University, USA
Sublingual and Buccal Delivery of MVA/Protein HIV Vaccination with a Needle-Free Injector Induces Robust Systemic and Mucosal Antibody Responses in Rhesus Macaques

Barbara K. Felber, NCI, National Institutes of Health, USA
DNA+Protein HIV Vaccine Protection against SHIV Challenge upon Same-Site Administration in Macaques

Matthias Georg Pauthner, The Scripps Research Institute, USA
Vaccine-Induced Protection from Autologous Tier 2 SHIV-BG505 Challenge

Keyun Wang, NIAID, National Institutes of Health, USA
Trispecific Broadly Neutralizing HIV Antibodies Mediate Potent SHIV Protection in Macaques

Kristen W. Cohen, Fred Hutchinson Cancer Research Center, USA
*Expansion of VH1-2*02 Env-Specific B Cells by Vaccination*

Tongqing Zhou, NIAID, National Institutes of Health, USA
Priming with Glycan-deleted HIV-1 Env Trimers and Sequential Boosting with Glycan-Restored Immunogens Induces Immune Responses that Neutralize Diverse Tier-2 Viruses

Daniel P. Leaman, The Scripps Research Institute, USA
Membrane Env Liposomes as a Platform for Immunization with Membrane-Incorporated HIV Env Spikes

Jon Steichen, The Scripps Research Institute, USA
Germline-Targeting for HCDR3-Dependent Broadly Neutralizing Antibodies

New Insights into HIV/SIV Env Biology and the Function of Non-Neutralizing Antibodies (J6)

Stuart J. Neil, King's College London, UK
Resistance of Transmitted Founder HIV-1 to IFITM-Mediated Restriction

***Beatrice H. Hahn**, University of Pennsylvania, USA
SIVcpz and SIVgor Env-Based Immunogens

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Michael Farzan, The Scripps Research Institute, USA

eCD4-Ig Unmasks Epitopes of Non-neutralizing Antibodies in Patient Serum to Mediate Potent ADCC

Lars Hangartner, The Scripps Research Institute, USA

Short Talk: Low-Dose PGT121 Sterilely Protects Macaques in an FcγR-independent Manner from Vaginal Challenge with SHIVSF163P3

Susan Zolla-Pazner, Icahn School of Medicine at Mount Sinai, USA

Short Talk: Induction with V1V2-scaffold Protein Immunogens of Cross-Clade Reactive V2-specific Effector Antibodies with Fc-Mediated Antiviral Functions

New Approaches in Vaccine Clinical Trial Design (J5)

***Anna P. Durbin**, Johns Hopkins Bloomberg School of Public Health, USA

Thomas Evans, TomegaVax, USA

Mathematical Modeling of Human Immune Responses to Design more Efficient Vaccine Clinical Development

Ashley J. Birkett, PATH, USA

New Approaches in Vaccine Clinical Trial Design: Maximizing Malaria Vaccine Efficacy and Informing Next-Generation Efforts

Chris Gast, PATH, USA

Novel and More Efficient Vaccine Clinical Trials using Adaptive Designs

Maryam Mukhamedova, NIAID, National Institutes of Health, USA

Short Talk: RSV Antibody Repertoire Analysis from Memory B Cells from RSV DS-Cav1-Vaccinated Adult Volunteers

Poster Session 3

THURSDAY, FEBRUARY 1

Induction of Broad Neutralizing Antibodies by Vaccination (J6)

Leonidas Stamatatos, Fred Hutchinson Cancer Research Center, USA

Targeted Expansion and Maturation of bNAbs B Cell Precursors

***John R. Mascola**, NIAID, National Institutes of Health, USA

Strategies to Elicit HIV-1 Fusion Peptide Directed Neutralizing Antibodies

William Schief, IAVI and The Scripps Research Institute, USA

Toward Elicitation of Broadly Neutralizing Antibodies by Germline-Targeted Priming and Structure-Guided Boosting

Rogier W. Sanders, University of Amsterdam and Weill Cornell Medical College, Netherlands

Native-Like HIV-1 Envelope Trimers as a Platform to Activate Germline Precursors of Broadly Neutralizing Antibodies

Nicole A. Doria-Rose, NIAID, National Institutes of Health, USA

Short Talk: Development of Three MPER-directed Neutralizing Antibody Lineages in an HIV Infected Individual

Kevin O.

Saunders, Duke

University, USA

Short Talk:

Modification of

HIV Env

Glycosylation

Augments

Binding to

Unmutated

Common

Ancestor and

Intermediate

Antibodies of

V3-Glycan

Broadly

Neutralizing

Antibody Lineages

New Tools in

Vaccine

Manufacturing

and Product

Analytics (J5)

Sangeetha L.

Sagar, Sanofi

Pasteur, USA

Advances and

Challenges in

Vaccine

Development

and Manufacture

***Andrew Lees**,

Fina

Biosolutions,

USA

Talk Title to be

Announced

James N.

Thomas, Just

Biotherapeutics,

USA

Low-Cost

Manufacturing

and more Stable

Immunobiologics

for Use in Low

and Middle

Income

Countries

Phillip W.

Berman,

University of

California, Santa

Michael J. Moser,

FluGen, Inc., USA

Single-Replication

Influenza B Virus

Vaccine BM2SR

Provides Sterilizing

Immunity and

Cross-Lineage

Protection by

Inducing both

Cellular and

Cytokine

Responses in Mice

Masaru Kanekiyo,

NIAID, National

Institutes of Health,

USA

Targeting the

Conserved Stem

Supersite on

Influenza Virus

Hemagglutinin by

Human

Ighd-Encoded

Innate-Like Element

Rahul Shukla,

International Centre

for Genetic

Engineering and

Biotechnology, India

"Four-in-One"

Envelope-based

mosaic VLPs Elicit

Tetavalent

Neutralizing

Antibody Response

Devoid of

Enhancement

Potential in Mice

Guangzu Zhao,

University of

Queensland,

Australia

Self-Adjuvanting

and

Self-Assembling

Lipid Core Peptide

Vaccines against

Human Hookworm

Parasite

Wessam Melik,

Orebro University,

Sweden

Development of an

**FRIDAY,
FEBRUARY
2**

Departure

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Cruz, USA
Breaking the Logjam in HIV Envelope Vaccine Production: Robotics and Gene Editing to Improve Upstream and Downstream Manufacturing Processes

Mark S. Fife,
Pirbright Institute, UK
Short Talk: Gene Knockout Technology of Chicken Interferon Inducible Transmembrane Proteins (chFITMs) for Increased Vaccine Production

Gabriel Byrne,
University of California, Santa Cruz, USA
Short Talk: Use of Gene Editing for the Development of an Mgat1 Deficient CHO Cell Line Suitable for GMP Manufacturing of HIV Vaccines

Caroline B. Kjaerulff Mathiesen,
Metropolitan University College, University of Copenhagen, Denmark
Short Talk:

Edible TBEV Vaccine

Rocio Jimenez-Martinez,
Griffith University-QIMRB, Australia
Investigating Venom Derived Molecules that Augment Human Immune Function

Antibodies as Immunoprophylaxis and Treatment (J6)

Marina F. Caskey,
Rockefeller University, USA
Effects of Potent Broad Neutralizing Antibody Combinations in Humans

Julie Ledgerwood,
NIAID, National Institutes of Health, USA
Passive Immunization of HIV-1 Neutralizing Monoclonal Antibodies in Clinical Trials

***David D. Ho**,
Aaron Diamond AIDS Research Center, USA
Engineering HIV-Neutralizing Bispecific Antibodies

Peter D. Kwong,
NIAID, National Institutes of Health, USA
Short Talk: Recognition by Antibody of All Major Exposed Regions of the Prefusion Closed HIV-1 Env Trimer

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Short Form

Genetically Engineered Cell Factories Produce Glycoengineered Vaccines that Target Antigen Presenting Cells and Alter Immunity

Meet the Editors Panel (Joint)

Sonja Schmid,
Nature Publishing Group, USA
Kavitha Scranton,
Immunity, USA
Andrew J. Rennekamp,
Cell Press, USA
Lindsey Pujanandez,
Science Translational Medicine, USA

Workshop 3: How Best to Meet the Increasing Challenges Faced in Vaccine Development (J5)

***Tong-Ming Fu**,
Merck Research Laboratories, USA
Bruno Emanuel Correia, École Polytechnique Fédérale de Lausanne, Switzerland
On the Development of Precision Vaccines through Epitope-Focused Immunogens: A Case Study on

New Tools in Vaccine Formulation and Delivery (J5)

***David C. Kaslow**,
PATH, USA
Nathalie Garçon,
Bioaster, France
Adjuvants in Vaccines: From Aluminium to AS01: What Path for their Development and Licensure?

Rhea N. Coler,
Infectious Disease Research Institute, USA
Enhancing Immunogenicity and Protective Efficacy through Novel Adjuvants and Formulations
Patrick M. Reeves,
Massachusetts General Hospital, USA
Accelerated Development of a T Cell-Based Vaccine for Q Fever

Meeting Wrap-Up: Outcomes and Future Directions (Organizers) (J6)

Meeting Wrap-Up: Outcomes and Future Directions (Organizers) (J5)

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RSV

Lan Zhang,
Merck, USA
*Design and
Characterization
of an Improved
Fusion
Glycoprotein
Vaccine for
Respiratory
Syncytial Virus*