

# KEYSTONE SYMPOSIA

on Molecular and Cellular Biology

## A Research Reboot of Tuberculosis on the Keystone Symposia 50th Anniversary - RESCHEDULED (RA3)

August 1-4, 2022 • Beaver Run Conference Center • Breckenridge, CO, USA

Scientific Organizers: Joseph Keane, Shabaana A. Khader, Thomas J. Scriba and Alan Sher

Supported by the Directors' Fund

Global Health Travel Award Deadline: July 21, 2022 / Scholarship Deadline: October 21, 2021 / Abstract Deadline: May 19, 2022 / Discounted Registration Deadline: June 1, 2022

### MONDAY, AUGUST 1

#### Arrival and Registration

### TUESDAY, AUGUST 2

#### Welcoming Remarks (Organizers) and Keynote Session

**Barry R. Bloom**, Harvard University, USA

*A Half Century of Research on Tuberculosis: Successes and Continued Challenges*

**Soumya Swaminathan**, World Health Organization, Switzerland

*The Current Global TB Problem*

#### When, How and Who Does Mtb Infect?

**Richard F. Silver**, Case Western Reserve University School of Medicine, USA

*Infection and Immunity in the Lung*

**Robin Wood**, University of Cape Town, South Africa

*Detection of Mycobacterium Tuberculosis in Paucibacillary Bioaerosols*

**Lalita Ramakrishnan**, University of Cambridge, UK

*Latent TB: Does it Exist and If So What Is It?*

**Rein Houben**, LSHTM, UK

*Short Talk: Quantifying the Thresholds and Pathways Following Mtb Infection*

**Hanif Esmail**, University College London, UK

*Short Talk: A 5-year Follow-up Study of Subclinical TB Identified by FDG-PET/CT in Asymptomatic, HIV Uninfected Household Contacts of Drug-resistant TB*

**Nadege Nziza**, Ragon Institute, USA

*Short Talk: Discriminatory Antibody Footprints Across Active and Latent Tuberculosis*

#### Workshop 1: Novel Approaches to TB Therapy

\***Alan Sher**, NIAID, National Institutes of Health, USA

\***Jennifer Phillips**, Washington University School of Medicine, USA

**Monique Theriault**, Cornell University, USA

*Metabolic Crosstalk and its Impacts on M. Tuberculosis Pathogenesis and Drug Discovery*

**Sadiya Parveen**, Johns Hopkins School of Medicine, USA

*A Novel Glutamine Metabolism Antagonist Inhibits Mtb Proliferation in Mice by a Mechanism Involving Immune Cell Metabolic Reprogramming*

**Conor Grant**, Trinity College Dublin, Ireland

*Tuberculosis Infection Reduces Macrophage Expression of Vitamin A Metabolism and Transport Genes*

**Kathryn Rahlwes**, UT Southwestern ME, USA

*The Role of Deubiquitinating Enzymes During Mycobacterium tuberculosis Infection of Macrophages*

**Arnaud Machelart**, Pasteur Institut of Lille, France

*Intrinsic Antibacterial Activity of Beta-cyclodextrins Potentiates their Effect as Drug Nanocarriers Against Tuberculosis*

**Vivek V. Thacker**, École Polytechnique Fédérale de Lausanne, Switzerland

*Microphysiological Systems as New Infection Models for Tuberculosis*

#### Short Talks Chosen from Abstracts

#### TB Lessons from Co-Morbidities and Susceptible Hosts

**Robert J. Wilkinson**, University of Cape Town, South Africa

*Talk Title to be Announced*

**Blanca I. Restrepo**, University of Texas HSC Houston, Brownsville Campus, USA

*TB-Diabetes in Adults vs Elderly: Unexpected Interactions*

\***Joseph Keane**, Trinity College Dublin, Ireland

*Cytokines Blockers and Tuberculosis Susceptibility*

**Brendan K. Podell**, Colorado State University, USA

*Short Talk: The Impact of Vitamin A Deficiency on Tuberculosis Progression*

**Annie Mayer Bridwell**, Washington University School of Medicine, USA

*Short Talk: Altered Diabetic Neutrophil Function as a Driver of Increased Susceptibility to M. Tuberculosis*

#### Poster Session 1

### WEDNESDAY, AUGUST 3

#### Breakthroughs in TB Chemotherapy, Drug Resistance and Assessing Therapeutic Outcome

**Clifton E. Barry III**, NIAID, National Institutes of Health, USA

*Clinical Trials, from the British Medical Research Council to PreDictTB*

**Valerie Mizrahi**, University of Cape Town, South Africa

*Opportunities and Challenges in Early-Stage TB Drug Discovery: Targeting DNA Replication as a Case Study*

**David Barros Aguirre**, GSK, Spain

*Current Clinical Candidates for TB Treatment*

**Bree B. Aldridge**, Tufts University, USA

*Design Principles of Combination Therapies for TB*

**Francesca Tomasi**, Harvard T. H. Chan School of Public Health, USA

*Short Talk: Peptidyl tRNA Hydrolase is Required to Maintain Pools of Charged tRNA in Mycobacterium tuberculosis*

**Divya Tiwari**, Queen Mary University of London, UK

*Short Talk: Characterizing Antimicrobial and Immunomodulatory Effects of Inhibiting M. Tuberculosis Biotin Protein Ligase*

**Gregory H. Babunovic**, Brigham and Women's Hospital, USA

*Short Talk: Carrots and Consumption - How Retinoic Acid Elicits Macrophage Control of Mycobacterium Tuberculosis*

#### Workshop 2: Young Investigator Workshop

\***Shabaana A. A. Khader**, Washington University School of Medicine, USA

**Stephen M. Carpenter**, Case Western Reserve University, USA

*Human Memory CD4+ T cells that Directly Recognize Macrophages Infected with Mycobacterium tuberculosis are a Smaller Subset of those that are Antigen-specific*

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**Munyaradzi Nyasha Musvosvi**, University of Cape Town, South Africa

*Distinct Specificities in the  $\alpha\beta$  T cell Response to Mycobacterium Tuberculosis Infection: Control Versus Disease Progression*

**Tyler D. Bold**, University of Minnesota, USA

*Human Immunology at the Site of HIV-Associated Tuberculosis Meningitis Infection Reveals Interferon Signatures Associated with Impaired Bacterial Control*

**Riti Sharan**, Texas Biomedical Research Institute, USA

*Impact of Timing of Antiretroviral Therapy on LTBI Reactivation in TB/SIV Co-Infection Model*

**Alissa C. Rothchild**, University of Massachusetts Amherst, USA

*Vaccination Modulates Early Innate Responses by Alveolar Macrophages to Mycobacterium Tuberculosis*

**Mark R. Cronan**, Max Planck Institute for Infection Biology, Germany

*A New Role for Type 2 Immunity in Tuberculosis Pathogenesis*

**Sladjana Prsic**, University of Hawaii at Manoa, USA

*Two-in-one: Zinc Limitation Triggers Formation of a Distinct Subpopulation of Mycobacterium Tuberculosis*

**Shuyi Ma**, University of Washington, USA

*Network-centric Functional Dissection of Ser/Thr Kinase Regulation in Mycobacterium Tuberculosis*

### The Host-Pathogen Interaction: An Emerging Focus on Immunometabolism

\***Larry S. Schlesinger**, Texas Biomedical Research Institute, USA

\***Shabaana A. A. Khader**, Washington University School of Medicine, USA

*Role of Immunometabolism in MDR TB*

**David G. Russell**, Cornell University, USA

*The causes and consequences of macrophage diversity in tuberculosis in vivo.*

**Adrie J. C. Steyn**, Africa Health Research Institute & UAB, South Africa

*Metabolic Mechanisms and Clinical Phenotypes*

**Eduardo Pinheiro Amaral**, NIAID, National Institutes of Health, USA

*Short Talk: The GPX4/BACH1 Axis Regulates Necrotic Cell Death and Host Resistance in Mycobacterium tuberculosis Infection in vivo by Modulating Both Glutathione and Iron Metabolism*

**Pallavi Chandra**, Washington University School of Medicine, USA

*Short Talk: Macrophage Global Metabolomics Identifies Cholesterol as a Mycobacterium Tuberculosis-host Co-metabolite Present in Human Tuberculosis Infection*

### Poster Session 2

#### THURSDAY, AUGUST 4

#### Recent Advances in Understanding Immune Correlates of Protection

**Elisa Nemes**, University of Cape Town, South Africa

*Immune Correlates of Protection in Human BCG and M72:ASO1E Trials*

**Frank Verreck**, Biomedical Primate Research Center, Netherlands

*Mucosal Revaccination after Intradermal BCG Prevents TB Disease in Rhesus macaques*

**Anne O'Garra**, Francis Crick Institute, UK

*Cross-Host Species Immune Correlates*

**Rosemary V. Swanson**, Washington University in St. Louis, USA

*Short Talk: Antigen-Specific B Cells Direct T Follicular-like Helper Cells into Lymphoid Follicles to Mediate Mycobacterium Tuberculosis Control*

**Ben Gern**, Seattle Children's Research Institute, USA

*Short Talk: Dissecting the Immune Regulation of Tuberculosis Granuloma Structure*

**Taylor Foreman**, National Institutes of Health, USA

*Short Talk: Rapid Depletion of CD4 T Cells in Tuberculosis Granulomas Following SIV Co-infection*

**Short Talks Chosen from Abstracts**

### Special Lecture

\***Thomas J. Scriba**, University of Cape Town, South Africa

**Sara Suliman**, University of California, San Francisco, USA  
*Opportunities and Challenges in TB Research from a Young Investigator's Perspective*

### Workshop 3: Vaccination and Immune Correlates

**Fergal Duffy**, Seattle Children's Research Institute, USA

*A Mouse-Derived Transcriptional Signature of Mtb Containment Predicts Human Outcomes*

**Dylan Sheerin**, WEHI, Australia

*Relationship of Blood Transcriptomic Signatures to Radiographic and Microbiologic Phenotype in a Cohort of Asymptomatic Tuberculosis Household Contacts*

**Michaela Reichmann**, University of Southampton, UK

*Investigating Tuberculosis Pathogenesis through Integrated Transcriptomic Analysis of Human Granulomas and a Biomimetic Model*

**Allison Nicole Bucsan**, NIH, USA

*IV-BCG Dose Ranging Study in Non-human Primates to Investigate Correlates of Vaccine-Mediated Protection against Tuberculosis*

**Maphe Mthembu**, Africa Health Research Institute, South Africa

*Discrepancy Between Mtb-specific IFN $\gamma$  and Mtb-specific IgG Responses in HIV+ People with Low CD4 Counts*

**Kievershen Nargan**, Africa Health Research Institute, South Africa

*RNAscope and Immunohistochemistry Reveals Bacilli Previously Undetected in Human Pulmonary TB Tissue Samples*

**Marjorie Nakibuule**, MRC/UVRI and LSHTM, Uganda

*B Cell Frequency in the Lungs of Active TB Patients with HIV. A TB Postmortem Study*

**Short Talks Chosen from Abstracts**

### Moving TB Vaccine Research Forward in the Next 50 Years: New Perspectives and Opportunities

**Thomas J. Scriba**, University of Cape Town, South Africa

*Clinical Development of TB Vaccines: What We Know and What We Don't Know*

**Maziar Divangahi**, McGill University, Canada

*Immune Mechanism in TB vs Respiratory Virus Infection: Learning from Each Other*

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**Rocky Lai**, University of Massachusetts Medical School, USA  
*Short Talk: Vaccine-Mediated Protection in Genetically Diverse  
Collaborative Cross - A Model for Pre-Clinical Vaccine Testing*

### Short Talks Chosen from Abstracts

### Closing Keynote Address

\***Joseph Keane**, Trinity College Dublin, Ireland

**Eric J. Rubin**, Harvard T.H. Chan School of Public Health, USA  
*The Future of TB Research and Control in an Age of Viral Pandemics*

### Meeting Wrap-Up: Outcomes and Future Directions

**Anne O'Garra**, Francis Crick Institute, UK

### Poster Session 3

### FRIDAY, AUGUST 5

### Departure