

Forum on Microbial Threats

Innovations for Tackling Tuberculosis in the Time of COVID-19

**Part Two of a Two-Part Virtual Workshop
September 14-16, 2021**

**Innovations for
Tackling
Tuberculosis
in the Time of
COVID-19**

**September 14–16, 2021
11:00AM–2:30PM EST**

*The National
Academies of* | SCIENCES
ENGINEERING
MEDICINE

VIRTUAL WORKSHOP



The National Academies of
SCIENCES • ENGINEERING • MEDICINE

The National Academies of
SCIENCES • ENGINEERING • MEDICINE
**INNOVATIONS FOR TACKLING
TUBERCULOSIS IN THE TIME OF COVID-19**

**Part Two of a Two-Part Virtual Workshop
September 14-16, 2021**

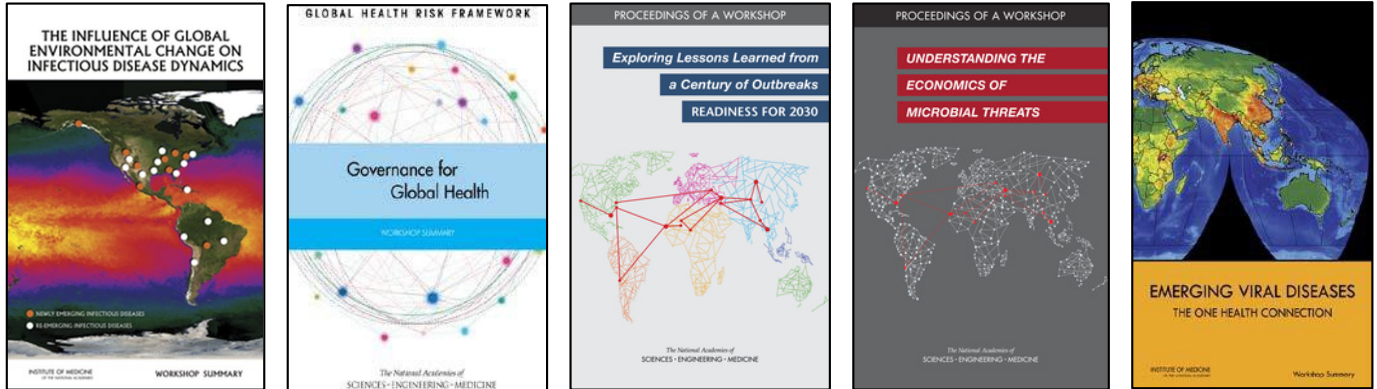
TABLE OF CONTENTS

About the Forum.....	page 2
Agenda	page 5
Planning Committee	page 10
Upcoming Activities.....	page 17

The National Academies of
SCIENCES • ENGINEERING • MEDICINE

HEALTH AND MEDICINE DIVISION
BOARD ON GLOBAL HEALTH

THE FORUM ON MICROBIAL THREATS



ABOUT THE FORUM

The Forum on Microbial Threats of the National Academies of Sciences, Engineering, and Medicine (National Academies) was created in 1996 at the request of the Centers for Disease Control and Prevention and the National Institutes of Health to provide a structured opportunity for discussion and scrutiny of critical, and possibly contentious, scientific and policy issues related to research on and the prevention, detection, surveillance, and responses to emerging and reemerging infectious diseases in humans, plants and animals as well as the microbiome in health and disease. The Forum brings together leaders from government agencies, industry, academia, and nonprofit and philanthropic organizations to facilitate cross-sector dialogue and collaboration through public debate and private consultation to stimulate original thinking about the most pressing issues across the spectrum of microbial threats.

Despite decades of progress, the need for the Forum on Microbial Threats remains. Problems such as MERS, Ebola, Chikungunya, Zika, yellow fever, and antibiotic resistance demonstrate how the issue of emerging infections is global and unrelenting. The drivers are ever more pervasive, and the consequences—human, social, and economic—loom larger than ever.

The Forum convenes several times each year to identify and discuss key problems and strategies in the area of microbial threats. To supplement the perspectives and expertise of its members, the Forum also holds public workshops to engage a wide range of experts, members of the public, and the policy community. All workshops are summarized in high quality scholarly workshop proceedings that are available for free download from the National Academies Press.

The Forum on Microbial Threats is part of the National Academies' Board on Global Health. For more information about the Forum, please visit our website: www.nationalacademies.org/microbialthreats.

SPONSORS

Financial support for the Forum is derived from the following government agencies, industries, and nonprofit and philanthropic associations:

- Biomedical Advanced Research and Development Authority
- U.S. Agency for International Development
- U.S. Centers for Disease Control and Prevention
- U.S. Department of Homeland Security
- U.S. Department of Veterans Affairs
- U.S. Food and Drug Administration
- U.S. National Institute of Allergy and Infectious Diseases
- Uniformed Services University of the Health Sciences
- American Society of Tropical Medicine and Hygiene
- Burroughs Wellcome Fund
- EcoHealth Alliance
- Infectious Diseases Society of America
- Johnson & Johnson
- Merck & Co., Inc.
- New Venture Fund
- Sanofi Pasteur

The Forum greatly appreciates our sponsors that make intellectual and financial contributions to the Forum's work.

HIGHLIGHTS OF RECENT WORKSHOP PROCEEDINGS

- The Critical Public Health Value of Vaccines: Tackling Issues of Access and Hesitancy: Proceedings of a Workshop (2021)
- Vaccine Access and Hesitancy: Part One of a Workshop Series: Proceedings of a Workshop—in Brief (2020)
- Exploring the Frontiers of Innovation to Tackle Microbial Threats: Proceedings of a Workshop (2020)
- The Convergence of Infectious Diseases and Noncommunicable Diseases: Proceedings of a Workshop (2019)
- Exploring Lessons Learned from a Century of Outbreaks: Readiness for 2030: Proceedings of a Workshop (2019)
- Understanding the Economics of Microbial Threats: Proceedings of a Workshop (2018)
- Urbanization and Slums: Infectious Diseases in the Built Environment: Proceedings of a Workshop (2018)
- Combating Antimicrobial Resistance: A One Health Approach to a Global Threat: Proceedings of a Workshop (2017)
- Building Communication Capacity to Counter Infectious Disease Threats: Proceedings of a Workshop (2017)

FORUM'S ACTION COLLABORATIVE – ONE HEALTH

The Forum's One Health Action Collaborative (OHAC), led by Gail Hansen, D.V.M., is an ad hoc activity that engages a community of participants who are interested in contributing to ongoing exploration and information sharing related to One Health topics. OHAC is committed to accelerating the implementation of a One Health approach in the field to counter microbial threats. Members include a subset of Forum members and a diverse range of external stakeholders from multiple sectors and disciplines such as public health, animal health, plant pathology, agriculture, environment, biotechnology, and others. Drawing from the dynamic discussions over regular conference calls, OHAC advises on One Health efforts that are internal and external to the National Academies, through the publication of papers and the hosting of seminars. For more info, [click here](#).

FORUM MEMBERSHIP

Membership in the Forum includes a diverse range of stakeholders from multiple sectors.

Peter Daszak, Ph.D. (Chair)

EcoHealth Alliance

Kent E. Kester, M.D. (Vice Chair)

Sanofi Pasteur

Rima F. Khabbaz, M.D. (Vice Chair)

U.S. Centers for Disease Control and Prevention

Emily Abraham, Dr.PH.

Johnson & Johnson

Kevin Anderson, Ph.D.

U.S. Department of Homeland Security

Cristina Cassetti, Ph.D.

National Institute of Allergy and
Infectious Diseases

Andrew Clements, Ph.D.

U.S. Agency for International
Development

Scott F. Dowell, M.D., M.P.H.

Bill and Melinda Gates Foundation

Marcos A. Espinal, M.D., Dr.P.H., M.P.H.

Pan American Health Organization

Eva Harris, Ph.D.

University of California, Berkeley

Elizabeth D. Hermsen, Pharm.D., M.B.A.

Merck & Co., Inc.

Christopher R. Houchens, Ph.D.

Biomedical Advanced Research and
Development Authority

Chandy C. John, M.D., M.S.

American Society of Tropical Medicine and Hygiene

Mark G. Kortepeter, M.D., M.P.H.

Uniformed Services University of Health Sciences

Michael Mair, M.P.H.

U.S. Food and Drug Administration

Jonna A. K. Mazet, D.V.M., M.P.V.M., Ph.D.

University of California, Davis

Victoria McGovern, Ph.D.

Burroughs Wellcome Fund

Sally A. Miller, Ph.D.

The Ohio State University

Suerie Moon, Ph.D., M.P.A.

The Graduate Institute, Geneva

Rafael Obregon, Ph.D., M.A.

United Nations Children's Fund

Kumanan Rasanathan, M.B.Ch.B., M.P.H

Health Systems Global

Gary A. Roselle, M.D.

U.S. Department of Veterans Affairs

Peter A. Sands, M.P.A.

The Global Fund to Fight AIDS,
Tuberculosis & Malaria

Thomas W. Scott, Ph.D.

University of California, Davis

Matthew Zahn, M.D.

Orange County Health Care Agency

FORUM STAFF

Julie Liao, Ph.D.

Director, Forum on Microbial Threats

(202)-334-2191

JLiao@nas.edu

Charles Minicucci

Research Assistant

(202)-334-2157

CMinicucci@nas.edu

Claire Biffl

Senior Program Assistant

CBiffl@nas.edu

The National Academies of
SCIENCES • ENGINEERING • MEDICINE

Innovations for Tackling Tuberculosis in the Time of COVID-19

Part Two of a Two-Part Virtual Workshop
September 14-16, 2021

AGENDA

Objectives:

This two-part public workshop will examine future innovations required to meet the [United Nations High-Level Meeting \(UNHLM\) on Tuberculosis](#) targets in 2022 and the WHO [END TB Strategy](#) targets by 2030.

Despite being preventable and curable, tuberculosis (TB) has long been the world's deadliest infectious disease and continues to kill 1.4 million and sicken 10 million new people each and every year, mostly the poorest and most vulnerable people in the world. Unfortunately, COVID-19 and its mitigation efforts have taken a devastating toll on countries with the highest burden of TB disease and the global TB response, threatening to reverse up to eight years of progress. Recent [modeling exercises](#) project that between 2020 and 2025, the initial impact in 2020 of the COVID-19 pandemic will result in an additional 1.4 million TB deaths. The webinar series will consider the science behind the innovations required to bring TB diagnosis, treatment, prevention, and political commitment to the 21st century and achieve the ambitious targets set by the UNHLM and WHO.

This public webinar series will feature invited presentations and discussions to consider:

- How can we accelerate the development of affordable point-of-care tests for TB? What barriers or challenges have prevented the development of accessible point-of-care tests for TB for low and middle income countries?
- Improvements in the usual care for TB: Can we achieve a two-week, non-toxic treatment for drug-sensitive and drug-resistant TB?
- How can we rapidly use the TB platform, such as contact investigation, in low- to middle-income countries to address COVID-19 and other airborne infections to prevent future pandemics?
- How can we ensure increased and sustained commitments to reach the UNHLM TB targets in high burden countries, despite the challenges from COVID-19?

A proceedings of the presentations and discussions at the webinar will be prepared by a designated rapporteur in accordance with institutional guidelines. For more information on this virtual workshop, please visit the [main project page](#).

WORKSHOP – PART TWO

Tuesday, September 14, 2021

11:00 AM – 2:30 PM ET

Workshop Opening

11:00 AM **Welcome and Session Goals**

PETER DASZAK

Chair, Forum on Microbial Threats

President, EcoHealth Alliance

LUCICA DITIU, *moderator*

11:05 AM **Sponsor Remarks**

Jennifer Adams, Senior Deputy Assistant Administrator, Bureau for Global Health

11:20 AM **Building a Tuberculosis-Free World: Progress Update**

Eric Goosby (University of California, San Francisco)

15 min Q&A

Realities of MDR-TB and Challenges for TB Control

Matteo Zignol (World Health Organization)

15 min Q&A

Session One: Detect

12:15 PM **Rapid Acceleration of Diagnostics: The COVID Experience**

Matthew McMahon (Director, Small Business Education and Entrepreneurial Development, NIH)

15 min Q&A

12:45 PM **Panel Discussion on Diagnostic Advances**

Point of Care Molecular Platform for Diagnosis of TB and Other Infectious Respiratory Diseases

- Morten Ruhwald (FIND, the global alliance for diagnostics)

Platform Technologies for Detection of Multiple Agents

- Zvi Marom (BATM) and Eran Zahavy (BATM)

Improving X-ray Accessibility

- Luan Vo (Friends for International Tuberculosis Relief)

Implementation Challenges with New TB Diagnostics

- Kaiser Shen (United States Agency for International Development)

1:15 PM **Enhancing Adherence, Infection Control Capacities, and Cost Effectiveness**

Expansion and Improvements to Contact Tracing and Engagement: Mobile or Digital Platforms from the COVID-19 Pandemic

- Aamir Khan (IRD)

Telehealth and Digital Adherence Technologies

- Bruce Thomas (The Arcady Group)

Innovative Strategies to Cost-Share Investments in Health Care Systems by Partnering with Other Disease Burdens in LMICs

- Monique K. Mansoura (MITRE)

Infection Prevention

- Edward Nardell (Harvard Medical School and the T.H. Chan School of Public Health)

Management of Latent TB Infection: Gaps and Opportunities

- Gavin Churchyard (The Aurum Institute)

2:15 PM **Reflections on Session One**
LUCICA DITIU, *moderator*

2:30 PM **Adjourn**

WORKSHOP PART 2
Wednesday, September 15, 2021
11:00 AM – 2:30 PM ET

SESSION TWO: Vaccines and Therapeutics

11:00 AM **Welcome & Session Goals**

KENT KESTER, *moderator*

11:05 AM **Leveraging Existing Tools and New Technologies**

BCG Re-Vaccination

- Alex Schmidt (Bill & Melinda Gates Medical Research Institute)

Promising New Adjuvants and Late-Stage Clinical Development Vaccine Candidates

- Steve Reed (University of Washington; HDT Bio)

How Host-Directed Therapies Can Change the Development Landscape

- Daniel Kalman (Emory University)

Immune Mechanisms of Protection Against TB

- Rhea Coler (Seattle Children's Hospital)

12:00 PM **Transforming Treatment Options**

CHARLES WELLS, *moderator*

The Key to Success for Developing a New Regimen to Advance TB Treatment: Lessons from TBTC Study 31 (S31/A5349)

- Payam Nahid (University of California, San Francisco)

What It Takes to Roll Out a New Treatment Regimen: Lessons from Drug Resistant TB

- Adrian Thomas (Johnson & Johnson)
- Norbert Ndjeka (National Department of Health, South Africa)

Bringing Innovation to the Development of New Transformative TB Regimens

- David Hermann (Bill and Melinda Gates Foundation)

Importance of Context-Specific Economic Analyses to Inform Future Program Design and Investment

- Anna Vassall (London School of Hygiene & Tropical Medicine)

- 1:00 PM **Expert Reflections and Discussion on Critical Elements for Implementation**
- Ezra Shimeles Tessler (TB Data, Impact Assessment and Communications Hub, USAID; John Snow, Inc.)
 - Richard Chaisson (Johns Hopkins University School of Medicine)
- 2:15 PM **Closing Remarks**
Session moderators
KENT KESTER
CHARLES WELLS
- 2:30 PM **Adjourn**

WORKSHOP PART 2
Thursday, September 16, 2021
11:00 AM – 2:30 PM ET

SESSION THREE

Future: Financing, Ambition and Preparedness

- 11:00 AM **Welcome: Session Goals & Bold Moves**
PETER SANDS, *moderator*
- 11:10 AM **Opening Remarks**
VICTOR DZAU, *President, National Academy of Medicine*
- 11:15 AM **A Place for TB in the Pandemic Preparedness Agenda**
Tharman Shanmugaratnam (Senior Minister and Coordinating Minister for Social Policies, Singapore)
- 11:50 AM **Achieving Synergy in Global Health Security Preparedness against Respiratory Pathogens: Recognition of TB as a Leading Killer**
PETER SANDS, *moderator*
- John Bell (University of Oxford)
 - Bruce Gellin (The Rockefeller Foundation)
 - Rebecca Katz (Georgetown University, Center for Global Health Science and Security)
 - Michael Callahan (Massachusetts General Hospital; United Therapeutics)
- 1:05 PM **Making the Case for Financing TB Elimination**
MARGARET HAMBURG, *moderator*
- The Cost of Failing to Achieve the End TB Targets: A Full Economic Analysis**
- Michael Reid (University of California, San Francisco)
- Why TB is One of the Best Investments on the SDG Agenda**
- Bjorn Lomborg (Copenhagen Consensus Center)
- Smart Investments in Ending TB**
- Mark Dybul (Georgetown University, Center for Global Health Practice and Impact)
- Implications for TB from the High-Level Independent Panel on Financing the Global Commons for Pandemic Preparedness and Response**

- Amanda Glassman (Center for Global Development)

2:00PM

Closing Remarks

MARGARET HAMBURG, *moderator*

GAIL CASSELL, *workshop co-chair*

KENNETH CASTRO, *workshop co-chair*

2:30 PM

Adjourn

The National Academies of
SCIENCES • ENGINEERING • MEDICINE

**Innovations for Tackling Tuberculosis in the
Time of COVID-19**

A Two-Part Virtual Workshop

PLANNING COMMITTEE

Gail H. Cassell, Ph.D. (Co-Chair)

Senior Lecturer on Global Health and Social Medicine
Harvard Medical School

Kenneth G. Castro, M.D. (Co-Chair)

Professor of Global Health, Epidemiology, and
Infectious Diseases
Rollins School of Public Health and School of Medicine
Emory University

Emily Abraham, Dr.P.H.[†]

Director, External Affairs and Policy
Global Public Health at Johnson & Johnson

Andrew Clements, Ph.D.[†]

Senior Technical Advisor, Emerging Threats Division
U.S. Agency for International Development

Lucica Ditiu, M.D.

Executive Director
Stop TB Partnership

Marcos A. Espinal, M.D., Dr.P.H., M.P.H.[†]

Director, Department of Communicable
Diseases and Health Analysis
Pan American Health Organization

Hamidah Hussain, MBBS, MSC, Ph.D.

Global Technical Lead
IRD

Tereza Kasaeva, M.D., Ph.D., M.S.

Director, Global Tuberculosis Programme
World Health Organization

Kent E. Kester, M.D.[†]

Vice President and Head
Translational Science and Biomarkers
Sanofi Pasteur

Monique K. Mansoura, Ph.D., M.S., M.B.A.

Executive Director
Global Health Security and Biotechnology
MITRE

Peter Sands, M.P.A.[†]

Executive Director
The Global Fund to Fight AIDS, Tuberculosis
and Malaria

Charles Wells, M.D.

Head of Therapeutics Development
Bill & Melinda Gates Medical Research Institute

[†] Member, Forum on Microbial Threats

The National Academies of
SCIENCES • ENGINEERING • MEDICINE

Innovations for Tackling Tuberculosis in the Time of COVID-19

A Two-Part Virtual Workshop

PLANNING COMMITTEE BIOGRAPHIES

Gail H. Cassell, Ph.D., D.Sc. (Hon.), (*Co-Chair*) is Senior Lecturer, Department of Global Health and Social Medicine, Harvard Medical School. She is a member of the National Academy of Medicine [formerly the Institute of Medicine (IOM)] of the National Academy of Sciences and served two terms on the IOM Council, the governing board. She is a former member of the Health Sciences Policy Board and was an inaugural member of the Emerging Infectious Disease Forum. She founded the IOM Forum on Drug Discovery, Development and Translation and she was the inaugural Co-Chair of the Forum during which time she organized 6 IOM workshops in South Africa, Russia, India, and China in collaboration with the National Academy of Sciences in these countries to assess the realities of Drug Resistant TB and to develop a blue print for action. She is former Vice President for Scientific Affairs and Distinguished Lilly Research Scholar of Infectious Diseases and former Vice President for Infectious Diseases Drug Discovery and Development of Eli Lilly and Company Indianapolis, Indiana. In this capacity among other things, she was responsible for initiating and leading the not-for-profit Lilly TB Drug Discovery Initiative launched in 2007. In 2003, she was one of two individuals at Lilly who initiated and developed the Lilly Multidrug Resistant Tuberculosis (MDRTB) Partnership. The partnership has resulted in company support to date exceeding \$170 million dollars. Prior to moving to Lilly in 1997, Dr. Cassell was the former Charles H. McCauley Professor and Chairman of the Department of Microbiology at the University of Alabama Schools of Medicine and Dentistry at Birmingham, a department which ranked first in research funding from the National Institutes of Health (NIH) during the decade of her leadership. She obtained her B.S. from the University of Alabama in Tuscaloosa and in 1993 was selected by that institution as one of the top 31 female graduates of the Centennial following the admission of the first female to the University in 1893. She obtained her Ph.D. in Microbiology from the University of Alabama at Birmingham and was selected as its 2003 Distinguished Alumnus. She is a past President of the American Society for Microbiology and is currently serving her second elected term on the Board of Governors of the American Academy of Microbiology. Dr. Cassell is an elected life time member of the U.S Council on Foreign Relations. She was named to the original Board of Scientific Councilors of the Center for Infectious Diseases, Centers for Disease Control (CDC) and served as Chair of the Board. She has served on the Advisory Board of the of the Director of NIH, Director of CDC, and the Secretary of Health and Human Services Advisory Council of Public Health Preparedness, the Food and Drug Administration's (FDA) Science Board, the Advisory Committee to the Commissioner. She was a member of the NIH Science Management Board and Advisory Councils of the National Institute of Allergy and Infectious Diseases and the Fogarty International Center of NIH. For two decades she was a member of the Steering Committee of the U.S.-Japan Cooperative Medical Sciences Program responsible for advising the respective governments on joint research agendas, (U.S. State Department/Japan Ministry of Foreign Affairs). She was instrumental in establishment of the U.S./Russia Cooperative Medical Sciences and Training Program under the Bilateral Presidential Commission in 2009 which was a collaboration involving NIH, the US National Academy of Sciences, the Russian Academy of Sciences, and the Russian Academy of Medical Sciences. In 2012, the American Society for Microbiology and the Federation of European Microbiology Societies established the Mäkelä-Cassell Exchange Program for pioneering international engagement for young scientists. She has served on several editorial boards of scientific journals and has authored over 350 articles and book chapters. She has received national and international awards for her research in infectious diseases, including: two honorary degrees; the CDC Honor Award in Public Health for exceptional leadership and contributions in the development and implementation of CDC's Emerging Infectious Disease Plan 1997; a Citation from the FDA Commissioner for her role as Chair of the review of science and technology at the FDA and the Report FDA: Science and Mission at Risk 2008."

Kenneth G. Castro, M.D., (*Co-Chair*) Physician-scientist trained in epidemiology, with a specialty in internal medicine and subspecialty in infectious diseases. An award-winning author of more than 175 scholarly and evidence-based policy

The National Academies of

SCIENCES • ENGINEERING • MEDICINE

publications; serves as a peer reviewer for numerous scientific journals and is an associate editor for the journals *International Journal of Tuberculosis and Lung Disease* and *Emerging Infectious Diseases*. A native Puerto Rican, Dr. Castro speaks fluent Spanish, and has frequently served as advisor to the Puerto Rico Department of Health, the Pan American Health Organization, World Health Organization, and several Ministries of Health in countries where TB and HIV constitute major public health problems. In 2008 Dr. Castro was recognized by the Hispanic Officers Advisory Committee, U.S. Public Health Service Commissioned Corps with the prestigious Juan Carlos Finlay award. In October 22, 2011, he was profiled in *The Lancet* as a “Public Health Hero” by Associate Editor Pamela Das. In March 2014 he received the Lifetime Achievement Award from the International Union Against Tuberculosis and Lung Diseases, North America Region, and the Lifetime Achievement Award conferred by the U.S. Agency for International Development. In June 2016 he received the prestigious CDC Charles C. Shepard Lifetime Science Achievement Award. "This award recognizes individuals for a body of work contributing to public health."

Emily Abraham, Dr.P.H., In her role as Director of External Affairs and Policy for Johnson & Johnson Global Public Health, Emily Abraham, DrPH focuses on tuberculosis, HIV, AMR, and NCDs. Her background is in the intersection of global/domestic public health and business, with expertise in policy, management, research, health economics, market access, and digital health across multiple disease areas.

Andrew Clements, Ph.D. is a Senior Scientific Advisor for the Emerging Threats Division in the U.S. Agency for International Development's Bureau for Global Health. He received his Ph.D. in Anaerobic Microbiology from Virginia Tech and completed his post-doctoral training in biochemistry at the National Institutes of Health. Between 1997 and 2005, he served as an infectious disease advisor at USAID focusing on the development, management, and monitoring of international programs to address malaria, tuberculosis, antimicrobial resistance, and infectious disease surveillance. Since 2005, he has managed a number of projects (PREDICT, PREVENT) and partnerships with the Food and Agriculture Organization of the UN and the World Health Organization that support prevention, detection, and response to emerging zoonotic threats in developing countries. He also analyzes trends for emerging zoonotic threats and has participated in USAID's responses to new diseases, including H5N1 and H7N9 avian influenza, H1N1 pandemic influenza, MERS-CoV, and Ebola.

Lucica Ditiu, M.D., Executive Director of the Stop TB Partnership is a Romanian pulmonologist, accomplished professional and leader in the global fight against tuberculosis (TB) and other communicable diseases. Dr. Ditiu graduated from the University of Medicine and Pharmacy in Bucharest, Romania in 1992 and has the specialization on Lung Diseases Specialist acquired in 1998. Dr. Ditiu is UN staff since 2000 and in this capacity she led emergency and preparedness and TB related work in Albania, Macedonia and Kosovo; she was the head of WHO Balkan Office, a TB and TB/HIV Medical Officer in WHO Regional Office for Europe and the lead of the TB REACH of Stop TB Partnership. Over her more than 20 years international career in public health, Dr. Ditiu published numerous articles, research papers, op-eds and interviews and served in different Boards and committees, including the Global Fund. Dr. Ditiu's work is driven by the firm belief that we should "leave no one behind" and is one of the strongest advocates within the international community in the fight for ensuring unrestricted access to quality diagnosis, treatment and care for all people, especially the most marginalized. A firm believer in innovation, flexibility, change, breaking the rules and thinking out of the box, Dr. Ditiu is dedicated to driving political commitment and engagement to accelerate the efforts to End TB. Dr. Ditiu participated in MDR TB related meetings of the National Academy.

Marcos A. Espinal, M.D., Dr.P.H., M.P.H., is the director of the Department of Communicable Diseases and Health Analysis at the Pan American Health Organization (PAHO), Regional Office of the World Health Organization (WHO) for the Americas. Dr. Espinal, a national of the Dominican Republic, holds a medical degree from the Universidad Autónoma de Santo Domingo, Dominican Republic (1985). He has an M.P.H. (1990) and a Dr.P.H. (1995) from the University of California at Berkeley School of Public Health. His work experience includes positions in the Ministry of Health of the Dominican Republic and the National Center for Research on Maternal and Child Health; the New York City Public Health Department; and the WHO where he worked for 13 years. Before joining PAHO, Dr. Espinal served as Executive Secretary of the WHO Stop TB Partnership, a global movement aiming at the elimination of TB as a public health problem. Dr. Espinal has published more than 100 peer-reviewed publications in the field of communicable diseases. He is a recipient of the Scientific Prize of the International Union against Tuberculosis and Lung Diseases, the Walter and Elise A. Hass

The National Academies of

SCIENCES • ENGINEERING • MEDICINE

International Award by the University of California at Berkeley for a distinguished record of service in international health, and the Princess Chichibu Memorial Tuberculosis Global Award by the Japan Anti-Tuberculosis Association.

Hamidah Hussain, MBBS, MSc, Ph.D., is a public health professional with over two decades of experience in designing, implementing, and evaluating global health service delivery programs and epidemiological research in Pakistan, Bangladesh, Tajikistan, Indonesia, Philippines and South Africa. Her portfolio includes work on active case finding for susceptible and drug resistant TB, childhood TB, TB preventive services, childhood vaccines, and preventable diseases, Malaria control programs along with costing and cost effectiveness of these interventions.

She led the IRD's flagship TB program based at the Indus Hospital in Karachi and was instrumental in scaling DR-TB treatment services in two provinces of Pakistan. She was also part of the team that received The Global Fund grant on TB and Malaria as Principal Recipient. Dr. Hussain is currently the Global Technical Lead for IRD's TB Preventive treatment programs and have assisted Pakistan and Afghanistan to draft their national TB preventive treatment guidelines.

She is the founding country director for IRD Bangladesh where she also served as the senior strategy advisor to the National TB Control Program providing leadership in establishing vision and technical direction of USAID funded Challenge TB project. Previously Dr. Hussain worked at the Johns Hopkins Bloomberg School of Public Health in Baltimore and BRAC in Bangladesh. Dr. Hussain received medical degree from The Aga Khan University, Master in Health Policy, Planning and Financing from London School of Hygiene and Tropical Medicine and PhD in health economics from University of Bergen, Norway.

Tereza Kasaeva, M.D., Ph.D., M.S., is the Director of the World Health Organization's Global TB Programme. As Director of the WHO Global TB Programme, she is responsible for setting norms, policies and standards on global TB prevention, control and care including on tackling drug resistance, coordinating technical support, monitoring the global situation, developing innovative interventions through translation of new evidence into policies & practice, promoting research & development and through addressing system challenges such as community and private sector engagement.

Dr. Kasaeva was previously the Deputy Director of the Department of Medical Care in the Ministry of Health of the Russian Federation. In this role, she conceived the concept of, and co-led the organisation of the First WHO Global Ministerial Conference on Ending TB in the Sustainable Development Era which took place on 16-17 November 2017 in Moscow. This landmark event brought together 75 Ministers of Health and other sectors from 120 country delegations overall, among over 1000 participants including civil society, partners, academia and the corporate sector. The Moscow Declaration to End TB, adopted at the conference, includes commitments and calls to action to accelerate efforts to end the TB epidemic, and will inform Heads-of-State participating in the first-ever United Nations General Assembly high-level meeting on TB in 2018. She also co-led efforts among BRICS Member States to set up and launch the BRICS TB Research Network to advance collaboration, mobilize resources and catalyze TBR&D.

As a leading health expert, Dr. Kasaeva has over 25 years of experience in public health, with over ten years at the Ministry of Health of the Russian Federation. She has worked closely with numerous stakeholders including Member States, civil society, as well as national and international partners. For the past decade, she coordinated the national TB programme in the Russian Federation. She facilitated and directed the cooperation between former Soviet Union countries, EUROZEU, BRICS and other countries on problems related to TB, HIV and migration. Since 2013, she has been the co-chair of the Secretariat of the High-Level Working Group of the Russian Ministry of Health and WHO on TB. In 2017, she was a member of the WHO Strategic and Technical Advisory Group for TB (STAG-TB). In addition, Dr. Kasaeva has been instrumental in leading efforts to, modernize the health system in the country, prevent and control socially significant diseases, as well as promote outpatient care for TB patients.

Dr. Kasaeva graduated from the North Ossetian State Medical Academy in the Russian Federation in 1992 as a Medical Doctor and specialized in Cardiology at the same Academy. She has a PhD in Public Health focusing on the perfection of outpatient technologies for the treatment of the TB patients from the I.M. Sechenov First Moscow State Medical University. She also has a Master's degree in International Relations with a focus on politics and governance from the European Studies Institute in Moscow, Russia. She is certified as a healthcare organization specialist by the Russian Medical Academy of Postgraduate Education. In 2015, she was awarded the prestigious Breastplate "Excellence in Public Health", and the Honorary Diploma of the Ministry of Health and Social Development of the Russian Federation in 2009.

The National Academies of

SCIENCES • ENGINEERING • MEDICINE

Kent E. Kester, M.D., is currently Vice President and Head, Translational Science and Biomarkers at Sanofi Pasteur. In this capacity, he leads a team of over 200 research and clinical professionals in the US and France focused on the translational development of new vaccines.

During a 24-year career in the U.S. Army, he worked extensively in clinical vaccine development and led multiple research platforms at the Walter Reed Army Institute of Research, the U.S. Department of Defense's largest and most diverse biomedical research laboratory with a major emphasis on emerging infectious diseases, an institution he later led as its Commander. His final military assignment was as the Associate Dean for Clinical Research in the School of Medicine at the Uniformed Services University of the Health Sciences (USUHS).

Dr. Kester holds an undergraduate degree from Bucknell University and an M.D. from Jefferson Medical College, completing his internship and residency in internal medicine at the University of Maryland and a research fellowship in infectious diseases at the Walter Reed Army Medical Center. Currently a member of the US Government Presidential Advisory Council on Combating Antibiotic-Resistant Bacteria (PACCARB) and the Department of Veterans Affairs Health Services Research & Development Service Merit Review Board, he previously chaired the Steering Committee of the NIAID/USUHS Infectious Disease Clinical Research Program, and has served as a member of the FDA Vaccines & Related Biologics Products Advisory Committee (VRBPAC), the NIAID Advisory Council, and the CDC Office of Infectious Diseases Board of Scientific Counselors. He is the Vice Chair of the National Academy of Medicine Forum on Microbial Threats and is also a member of the Standing Committee on Emerging Infectious Diseases and 21st Century Health Threats. Board-certified in both internal medicine and infectious diseases, Dr. Kester holds faculty appointments at USUHS and the University of Maryland; and is a fellow of the American College of Physicians, the Royal College of Physicians of Edinburgh, the Infectious Disease Society of America, and the American Society of Tropical Medicine and Hygiene. He is a member of the clinical faculty at the University of Maryland Shock Trauma Center in Baltimore and the Wilkes-Barre VA Medical Center.

Monique Mansoura, Ph.D., M.S., M.B.A., joined The MITRE Corporation as the Executive Director for Global Health Security and Biotechnology in September 2017. She brings technical, policy and business expertise from both the public and private sectors. For twenty years she has been a trailblazer on the development and sustainability of the industrial base and resilient supply chains central to the public-private partnerships that are vital to global health security, the bioeconomy and healthcare. She was a leader of the COVID-19 Healthcare Coalition, led by MITRE and the Mayo Clinic and received the MITRE President's Award in recognition of that work.

During a recent sabbatical, Monique explored new business models and financial vehicles for raising and deploying funds to enhance global health security as a Research Affiliate of the MIT Laboratory for Financial Engineering (LFE), led by Professor Andrew Lo.

She serves on the Board of the International Cancer Expert Corps (ICEC) and is dedicated to capacity and capability building for the provision of cancer care in low- and middle-income countries and in doing so, bridging the investment dichotomy between infectious diseases and cancer.

Monique earned a PhD in Bioengineering and a M.S. in Human Genetics from the University of Michigan, a B.S. in Chemical Engineering from Wayne State University, and an MBA in the Sloan Fellows Program in Innovation and Global Leadership at MIT.

Monique co-chaired (with Richard Hatchett) the 2015 IOM Workshop Planning Committee "Enabling Rapid Response and Sustained Capability with Medical Countermeasures to Mitigate Risk of Emerging Infectious Diseases" and served on the 2009-2010 workshop planning committee for "The Public Health Emergency Medical Countermeasures Enterprise - Innovative Strategies to Enhance Products from Discovery through Approval."

Peter Sands, M.P.A., is the executive director of The Global Fund to Fight AIDS, Tuberculosis, and Malaria. Since June 2015, Mr. Sands has been a research fellow at Harvard University, dividing his time between the Mossavar-Rahmani Center for Business and Government at Harvard Kennedy School and the Harvard Global Health Institute, part of the Harvard T.H. Chan School of Public Health, and working on a range of research projects in financial markets and regulation, fintech, and

The National Academies of SCIENCES • ENGINEERING • MEDICINE

global health. Mr. Sands' engagement with global health issues includes: chairing the U.S. National Academy of Medicine's Commission on a Global Health Risk Framework for the Future, which in January 2016 produced the highly influential report *The Neglected Dimension of Global Security: A Framework to Counter Infectious Disease Threats*; chairing the World Bank's International Working Group on financing preparedness, which in May 2017 published *From Panic and Neglect to Investing in Health Security: Financing Preparedness at a National Level*; authoring several papers on infectious disease crises in the *New England Journal of Medicine*, *The Lancet*, and *British Medical Journal*; being the lead non-executive director between 2011-2017 on the Board of the UK's Department of Health, which provides oversight and policy direction to the UK's National Health Service; and being an active member on both the U.S. National Academy of Science's Committee on Ensuring Access to Affordable Drugs and the Forum on Microbial Threats. Mr. Sands is a board member or advisor to several startups in the fintech and meditech arenas, such as Noble Markets (US) and Cera (UK). He was group chief executive of Standard Chartered PLC from November 2006 to June 2015. He joined the Board of Standard Chartered PLC as group finance director in May 2002, responsible for finance, strategy, risk and technology, and operations. Prior to this, Mr. Sands was a senior partner at worldwide consultants McKinsey & Co. Before joining McKinsey, he worked for the UK's Foreign and Commonwealth Office. He has served on various boards and commissions, including as a director of the World Economic Forum and co-chairman of Davos, governor of the UK's National Institute for Economic and Social Research, member of the International Advisory Board of the Monetary Authority of Singapore, member of the Browne Commission on Higher Education Funding in the UK, member of the China People's Association for Friendship with Foreign People's Global CEO Council, co-chair of the UK-India CEO Forum, board director of the Institute of International Finance, chairman of the International Monetary Conference, member of the International Advisory Board of Lingnan University, China, and trustee of the Camden Roundhouse, London. Mr. Sands graduated from Brasenose College, Oxford University with a first class degree in politics, philosophy, and economics. He also received a Master in Public Administration from Harvard University, where he was a Harkness Fellow. Mr. Sands, who grew up in Singapore and Malaysia, is married to author and bookshop owner, Betsy Tobin and has four children.

Charles Wells, M.D., currently serves as Head of Therapeutics Development at the Bill & Melinda Gates Medical Research Institute in Cambridge, Massachusetts, where he joined in May 2019. Previously he served as Executive VP for Global Health and Development for Infectious Diseases at Evotec carrying forward in this role with the transfer of the Infectious Diseases Therapeutics R&D group from Sanofi to Evotec in July 2018. His work in this role included overseeing development activities for new therapeutic agents for malaria, bacterial diseases and biologics development for HIV, chikungunya virus and viral hepatitis among other diseases. Prior to joining Sanofi in late 2015, he served as Senior Medical Director for the development and initial registration of delamanid (Deltyba) for treatment of multidrug resistant tuberculosis at Otsuka Pharmaceuticals, during 2007-2015. Before Otsuka, he served as Chief of the International Research and Programs Branch of the Division of Tuberculosis Elimination at the U.S. Centers for Disease Control and Prevention (CDC) during 2000-2007. He is a native of North Carolina where he completed his medical studies at the University of North Carolina at Chapel Hill in 1992 and then his post-graduate medical training in internal medicine and infectious diseases at Emory University, as well as the Epidemic Intelligence Service at CDC.

Charles previously served as a member in the role of industry representative for the National Academies of Science, Engineering, and Medicine, Committee on Clinical Trials during the 2014-2015 Ebola Outbreak in West Africa during Jan – Nov 2016.

The National Academies of
SCIENCES • ENGINEERING • MEDICINE

UPCOMING FROM THE FORUM ON MICROBIAL THREATS

**TOWARDS A POST-PANDEMIC WORLD:
LESSONS LEARNED FROM COVID-19 FOR
NOW AND THE FUTURE**



**TOWARDS A
POST-PANDEMIC
WORLD**

Lessons Learned From COVID-19
For Now and the Future

Virtual Workshop

September 21-24, 2021
10:00 AM - 2:30 PM ET

*The National
Academies of* | SCIENCES
ENGINEERING
MEDICINE

Free live webcast!

The Forum on Microbial Threats will host a multi-day public workshop that will broadly examine the response to COVID-19 in the US and abroad. These virtual events will host retrospective and prospective discussions on the broad impacts of the rapidly-evolving pandemic on human health and society. Events will explore new understandings, challenges, and emerging data for leaders in governments, public health systems, the private sector, and communities to consider in the ongoing pandemic responses with a view towards enhancing resilience and preparedness for future outbreaks.

Stay tuned for more details!

To receive a “Save the Date” announcement for our events, sign up for our listserv on our website:
www.nationalacademies.org/microbialthreats