Community Wastewater-based Infectious Disease Surveillance

Committee

Guy H. Palmer

Chair

Guy H. Palmer (NAM), Chair, holds the Jan and Jack Creighton Endowed Chair at Washington State University (WSU) where he is Regents Professor of Pathology & Infectious Diseases. He is board-certified in anatomic pathology. The founding director of WSU's Paul G. Allen School for Global Health, he leads interdisciplinary health research as the Senior Director of Global Health. Dr. Palmer also holds adjunct appointments with the University of Nairobi, the Center for Emerging and Re-emerging Infectious Diseases at the University of Washington, and the Universidad del Valle de Guatemala. He supports the wastewater-based COVID-19 surveillance program in Pullman, Washington by advising on public health interventions that are informed by wastewater-derived data. Dr. Palmer is a member of the National Academy of Medicine, a Medical Sciences Fellow of the American Association for the Advancement of Science, and a founding member of the Washington State Academy of Sciences. He previously served as Chair of the National Academies Committee on Examining the Long-Term Health and Economic Effects of Antimicrobial Resistance in the United States. Dr. Palmer earned his Ph.D. in Infectious Diseases from WSU and his B.S. in Biology and a D.V.M. from Kansas State University. He holds honorary doctorates from the University of Bern (Dr. Med.Vet, 2011) and Kansas State University (Ph.D. 2016).

Ami S. Bhatt

Member

Ami S. Bhatt is an associate professor at Stanford University in the Departments of Medicine (Hematology; Blood & Marrow Transplantation) and Genetics. She is a physician scientist with a strong interest in microbial genomics and metagenomics. Her team's research program seeks to illuminate the interplay between the microbial environment and host/clinical factors in human diseases by developing and applying novel molecular and computational tools to study strain level dynamics of the microbiome, to understand how microbial genomes change over time, and to predict the functional output of microbiomes. She is applying these tools to support wastewater-based disease surveillance in the San Francisco Bay area both for COVID-19 as well as emerging disease. Dr. Bhatt has received multiple awards including the Chen Award of Excellence from the Human Genome Organisation (HUGO) and the Sloan Foundation Fellowship; she is also an elected member of the American Society of Clinical Investigation. Dr. Bhatt cofounded the nonprofit, Global Oncology, and serves as the Director for Global Oncology for Stanford's Center for Innovation in Global Health. She received her M.D. and Ph.D. from the University of California, San Francisco, followed by residency, fellowship, chief residency and a post-doctoral fellowship at Harvard Medical School.

Dr. Bhatt is named on a patent for the use of tomato brown rugose fruit virus as a new indicator of fecal strength and contamination and control for viral RNA extraction from stool but claims no economic interest in the patent.

Marisa C. Eisenberg

Member

Marisa C. Eisenberg is an associate professor of Epidemiology, Complex Systems, and Mathematics at the University of Michigan, and the current director of the Center for the Study of Complex Systems. Her research is in mathematical epidemiology and infectious disease modeling, and blends mathematics, statistics, and epidemiology to understand transmission dynamics, inform intervention strategies, and improve forecasting. Her research includes a range of modeling and analysis of wastewater surveillance for infectious diseases, including polio, COVID-19, and other pathogens. During the pandemic, Dr. Eisenberg has been closely involved in COVID-19 response efforts at both the state and university level, developing modeling, analysis, and tools to understand COVID-19 in Michigan, for which she was recently awarded the UM President's Award for National and State Leadership. Dr. Eisenberg received her M.S. and Ph.D in Biomedical Engineering from the University of California, Los Angeles, and was a postdoctoral fellow at the Mathematical Biosciences Institute at Ohio State University.

Dr. Eisenberg receives CDC Epidemiology and Laboratory Capacity for Prevention and Control of Emerging Infectious Disease (ELC) funding via the Michigan Department of Health and Human Services (MDHHS) to support the state's COVID-19 wastewater surveillance program. Dr. Eisenberg has made public statements regarding the use of wastewater surveillance as a key tool to assess disease beyond COVID-19, including polio.

Raul A. Gonzalez

Member

Raul A. Gonzalez is an environmental scientist at Hampton Roads Sanitation District (HRSD). He runs HRSD's molecular pathogen program which is comprised of a molecular lab and field scientists. His group applies molecular methods to manmade infrastructure and their adjacent waters. During the COVID-19 pandemic, Dr. Gonzalez led the expansion of HRSD's research and laboratory capacity to identify the best methodological approaches to wastewater-based disease surveillance at the utility. Current projects use nucleic acid-based markers for a variety of applications, including identifying compromised sewer infrastructure and quantifying pathogen removal of various treatment trains. He previously worked at the Los Angeles County Sanitation District. Dr. Gonzalez earned his B.S. in Biology from the University of California Los Angeles and his Ph.D. in Environmental Science and Engineering at the University of North Carolina Chapel Hill.

Charles N. Haas

Member

Charles N. Haas (NAE) is the L. D. Betz Professor of Environmental Engineering at Drexel University where he has been since 1991. From 2005-2020, he was also head of the Department of Civil, Architectural & Environmental Engineering. He also has courtesy appointments in the Department of Emergency Medicine of the Drexel University College of Medicine and in the School of Public Health. For over 35 years, Professor Haas has specialized in the assessment of risk from and control of human exposure to pathogenic microorganisms and, in particular, the treatment of water and wastewater to minimize microbial risk to human health. He co-directed the U.S. EPA/DHS University Cooperative Center of Excellence – Center for Advancing Microbial Risk Assessment (CAMRA). He is a member of the National Academy of Engineering, a Board Certified Environmental Engineering Member by eminence of the American Academy of Environmental Engineers, and a fellow of American Academy for the Advancement of Science, the American Academy of Microbiology. He has previously served on numerous National Academies committees, including the Committee on Strategies for Identifying and Addressing Vulnerabilities Posed by Synthetic Biology and planning committees for two symposia on Gain of Function Research with H5N1/H7N9 Avian Influenza. He received his B.S. in biology and his M.S. in environmental engineering from the Illinois Institute of Technology, and his Ph.D. in environmental engineering from the University of Illinois at Urbana-Champaign.

Loren P. Hopkins

Member

Loren P. Hopkins is the Chief Environmental Science Officer at the City of Houston, Chief of the Bureau of Community and Children's Environmental Health at the Houston Health Department, and a Professor of Practice in the Department of Statistics at Rice University. In this dual capacity, she conducts applied environmental health research and uses the results to inform policies at the City of Houston to improve the health of the community. In May 2020, Dr. Hopkins established a critical wastewater surveillance program at the Houston Health Department that continues to serve as a barometer on the spatiotemporal prevalence of the SARS-CoV-2 virus in the City of Houston. The SARS-CoV-2 wastewater surveillance sampling results have informed public health intervention decisions and aided in improving the response to the COVID-19 pandemic in Houston. She received the 2016 Teaching and Mentoring Award from the Graduate Student Association at Rice University. She holds a B.S. in Geological Sciences with emphasis in Geophysics from University of Texas at Austin and a M.S. and a Ph.D.in Environmental Science and Engineering from Rice University.

Dr. Hopkins is also serving as a paid consultant via StatAnalytics IDD LLC through June 2022 to support work on a CDC-Foundation-funded project on best practices in wastewater surveillance. In her capacity as the Chief Environmental Science Officer for the City of Houston, Dr. Hopkins has made public statements explaining how the city uses wastewater-based disease surveillance to inform their health initiatives.

Na'Taki Osborne Jelks

Member

Na'Taki Osborne Jelks is assistant professor in the Environmental and Health Sciences Program at Spelman College in Atlanta, Georgia and Co-Founder of the West Atlanta Watershed Alliance, a community-based, environmental justice organization. In her research, Jelks champions community science and other participatory research approaches in which she trains community residents to be watershed researchers who monitor water quality and investigate local environmental conditions; giving them actionable data to press for solutions to urban watershed and community health challenges. In 2021, Dr. Jelks was named an Ecological Society of America Excellence in Ecology Scholar. Since 2018, Jelks has served on the National Environmental Justice Advisory Council, a federal advisory committee that works to integrate environmental justice into the Environmental Protection Agency's programs, policies and activities as well as to improve the environment or public health in communities disproportionately burdened by environmental harms and risks. Dr. Jelks holds a B.S. in Chemistry and Civil Engineering from Spelman College and the Georgia Institute of Technology, a M.P.H. in Environmental and Occupational Health from Emory University, and a Ph.D. in Public Health from Georgia State University.

Christine K. Johnson

Member

Christine K. Johnson (NAM) is Professor of Epidemiology and Ecosystem Health and Director of the EpiCenter for Disease Dynamics at the One Health Institute, University of California, Davis. Her work is committed to transdisciplinary research to characterize impacts of environmental change on animal and human health, inform preparedness for emerging threats, and guide public policy at the intersection of emerging disease and environmental health. Professor Johnson's research pioneers new approaches to characterization of emerging threats and disease dynamics at the animal-human interface in rapidly changing landscapes that constitute "fault lines" for disease emergence, disease spillover and subsequent spread. She leads the "EpiCenter for Emerging Infectious Disease Intelligence", one of NIAID's Centers for Emerging Infectious Disease (CREID) to investigate the environment and climate-related drivers for spillover and spread of emerging ebolaviruses, coronaviruses, and arboviruses. She is a member of the National Academy of Medicine and was awarded the Distinguished Scholarly Public Service Award. She earned a B.S. in Zoology and Political Science from Duke University, a Ph.D. in Epidemiology from the University of California, Davis, and a V.M.D. degree in Veterinary Medicine from the University of Pennsylvania.

Rob Knight

Member

Rob Knight is the founding Director of the Center for Microbiome Innovation and Professor of Pediatrics, Bioengineering, and Computer Science & Engineering at the University of California San Diego. His research has linked microbes to a range of health conditions, enhanced our understanding of microbes in many environments, and made high-throughput sequencing accessible to thousands of researchers around the world. His lab has produced many of the software tools and laboratory techniques that enabled high-throughput microbiome science, including QIIME and UniFrac. He is co-founder of the Earth Microbiome Project, the American Gut Project, and the company Biota, Inc., which uses DNA from microbes in the subsurface to guide oilfield decisions. He set up and runs the wastewater COVID-19 detection program and co-founded the COVID-19 testing lab at U.C. San Diego, which performs thousands of clinical tests per day and also sequences viral genomes out of wastewater and clinical samples. He is a Fellow of the American Association for the Advancement of Science and the American Academy of Microbiology and received the 2019 NIH Director's Pioneer Award and 2017 Massry Prize. Dr. Knight earned his B.S. in Biochemistry from the University of Otago and his Ph.D. in Evolutionary Biology from Princeton University.

Sandra L. McLellan

Member

Sandra L. McLellan is professor in the School of Freshwater Sciences at the University of Wisconsin-Milwaukee. Dr. McLellan's research program studies the human health relevance of microorganisms that flux between the primary habitat of human hosts and environmental reservoirs. Her research has identified new indicators of waterborne disease by characterizing the microbial population structure of sewage and also uses genomics and metagenomics to explore the unique microbiome of urban water infrastructure to understand the complex interactions within the community. Dr. McLellan currently works with the Wisconsin State Laboratory of Hygiene to conduct a statewide SARS-CoV-2 wastewater monitoring program. Dr. McLellan is a Fellow in the American Academy of Microbiology and is a member of the International Water Association and the International Society for Microbiology. She received her B.S. in Health Sciences from the University of Wisconsin-Milwaukee and Ph.D. from the University of Cincinnati College of Medicine in Environmental Health.

Dr. McLellan receives CDC Epidemiology and Laboratory Capacity for Prevention and Control of Emerging Infectious Disease (ELC) funding via the Wisconsin Department of Health Services to support the state's COVID-19 wastewater surveillance program.

Michelle M. Mello

Member

Michelle M. Mello (NAM) is Professor of Law at Stanford Law School and Professor of Health Policy at Stanford University School of Medicine. She conducts empirical research into issues at the intersection of law, ethics, and health policy, with a focus on understanding the effects of law and regulation on health care delivery and population health outcomes. Her research interests include medical liability, public health law, pharmaceuticals and vaccines, biomedical research ethics and governance, and health information privacy. Dr. Mello received the Alice S. Hersh New Investigator Award from AcademyHealth, a Greenwall Faculty Scholars Award in Bioethics, a Robert Wood Johnson Foundation Investigator Award in Health Policy Research, and is a member of the National Academy of Medicine. She holds B.A.'s in Political Science and Applied Ethics from Stanford University, an M.Phil. in Comparative Social Research from Oxford University, where she was a Marshall Scholar, a J.D. from the Yale Law School, and a Ph.D. in Health Policy and Administration from the University of North Carolina at Chapel Hill.

John Scott Meschke

Member

John Scott Meschke is professor and associate chair in the Department of Environmental and Occupational Health Sciences in the School of Public Health at the University of Washington. He is also an Adjunct Professor in Civil and Environmental Engineering at the University of Washington. Dr. Meschke is an environmental and occupational health microbiologist and virologist specializing in the fate, transport, detection and control of pathogens in environmental media. Over the last 10 years, his research has focused on development, validation and implementation of wastewater surveillance methods for Poliovirus, Salmonella Typhi, SARS-CoV-2 and other pathogens. Dr. Meschke is currently serving as a paid consultant to PATH (an international nongovernmental organization) on wastewater surveillance in developing countries and in an unpaid advisory role to the Washington State Department of Health to advise on wastewater surveillance methods in state correctional facilities. Dr. Meschke completed his B.S. in Biology and J.D. at the University of Kansas, his M.S. in Environmental Science at Indiana University, and his Ph.D. in Environmental Sciences and Engineering at the University of North Carolina at Chapel Hill.

Dr. Meschke receives CDC Epidemiology and Laboratory Capacity for Prevention and Control of Emerging Infectious Disease (ELC) funding, as a subject matter expert, via the Washington State Department of Health to support the state’s COVID-19 wastewater surveillance program. Dr. Meschke received donated supplies from Qiagen, Ceres Nano, and Macherey Nagel, to evaluate wastewater surveillance products for SARS-CoV-2 without restrictions on the conduct of the research or the publication of the results.

Rekha Singh

Member

Rekha Singh is Wastewater Surveillance Program Manager for the Virginia Department of Health where she partners with wastewater treatment plants, laboratories, local health departments to design and implement the wastewater surveillance program for Virginia. Prior to this, she co-led the State Testing Task Force for pandemic response and led establishing the OneLab program to enhance testing in the Commonwealth of Virginia. She has a background in epidemiology, environmental health, contaminants remediation, disease surveillance, water and wastewater, community engagement, the development of novel point-of-use drinking water treatment technologies, and deploying these technologies in the real world. Dr. Singh earned Ph.D. in Environmental Science & Engineering with a focus on Environmental Health and then an M.P.H. in Health Policy Law and Ethics from the University of Virginia.

Neeraj Sood

Member

Neeraj Sood is professor and vice dean for research at the University of Southern California (USC) Price School of Public Policy and also holds appointments in the Marshall Business School and the Keck School of Medicine at USC. He is Senior Fellow and Director of the COVID Initiative at the USC Schaeffer Center, Research Associate at National Bureau of Economic Research, and a visiting scholar at Amazon. He has published several papers on policy responses to COVID-19 pandemic including the effects of shelter in place policies on excess mortality, the effects of the pandemic on use of high value health care, the impact of the pandemic on use of telehealth, the impact of vaccines on mental health, and the impact of school closures on COVID-19 transmission. Dr. Sood received his B.A. in Economics from Delhi University, a M.A. in Economics from Delhi School of Economics, a M.A. in Economics from Indiana University Purdue University, and a Ph.D. in Policy Analysis from RAND Graduate School.

Dr. Sood receives CDC Epidemiology and Laboratory Capacity for Prevention and Control of Emerging Infectious Disease (ELC) funding via the Los Angeles County Department of Public Health and City of Los Angeles to support the county’s COVID-19 wastewater surveillance program.

Krista Wigginton

Member

Krista Wigginton is associate professor of Environmental Engineering in the Department of Civil and Environmental Engineering at the University of Michigan. Her research team focuses on viruses in the environment, including their mechanistic fate, the role they play in urban water microbial ecology, and developing novel detection methods. Prior to COVID-19, her team published studies on how coronaviruses behave in municipal wastewater and through water treatment processes, and developed methods for recovering them from water samples. During the COVID-19 pandemic, she has collaborated on a number of projects focused on implementing wastewater-based-epidemiology programs. She is the recipient of an NSF CAREER Award and the Water Research Foundation Paul L. Busch Award. Dr. Wigginton received her B.S. degree in Chemistry from the University of Idaho, and M.S. and Ph.D. degrees in Environmental Engineering from Virginia Tech.

Dr. Wigginton has worked with Verily Life Sciences on a CDC Foundation-funded project to demonstrate how to conduct and report wastewater-based disease surveillance. Dr. Wigginton receives CDC Epidemiology and Laboratory Capacity for Prevention and Control of Emerging Infectious Disease (ELC) funding via the Michigan Department of Health and Human Services (MDHHS) to support the state’s COVID-19 wastewater surveillance program.