

A NIST-Hosted Webinar on Measuring SARS-CoV-2 in Wastewater and Fecal Material: A Call for Standards

June 16, 2020
1 PM - 3 PM EDT

Speaker Abstracts & Bios

Scott Jackson, NIST

Opening Remarks

Bio: Scott Jackson joined The National Institute of Standards and Technology (NIST) in May of 2014. At NIST, Scott is currently the leader of the Complex Microbial Systems Group in the Biosystems and Biomaterials Division. In this current role, Scott is leading international efforts to improve microbiome and metagenomic measurements by organizing inter-lab studies, developing reference materials and reference methods, and developing in vitro tools that allow us to better understand microbial community resilience and evolution. Prior to joining NIST, Scott spent 11 years as a principal investigator with the FDA. At FDA, his research focused on characterizing the global genomic diversity of enteric pathogens, with applications for food safety, bioforensics, and public health. Scott did his PhD research in biochemistry and biophysics at The University of Maryland and Johns Hopkins University, respectfully, where he focused on the evolution of mobile genetic elements using yeast as a model genetic organism. Scott performed his undergraduate studies in Chemistry and Geology at the University of South Carolina.

Bharat Ramakrishna, OpenBiome

Fecal microbiota transplantation: Responding to the COVID-19 pandemic

OpenBiome is a non-profit stool bank providing access to fecal microbiota transplantation (FMT) for the treatment of recurrent *Clostridioides difficile* infection. OpenBiome's donor program has routinely screened for a variety of pathogens known to be shed in stool. Shedding of SARS-CoV-2 in stool has been documented and several FMT groups have published recommendations and protocols to minimize the potential transmission of SARS-CoV-2 via FMT. The key considerations for implementing direct stool testing for FMT donor screening will be discussed, including; interpretation of currently available data on stool shedding; potential screening methods for identifying asymptomatic stool donors (including orthogonal tests such as serology or nasopharyngeal viral RNA); and operational considerations for maintaining donor programs during the COVID-19 pandemic. Future areas of research to better inform best practices in donor screening will also be discussed.



Bio: Dr. Bharat Ramakrishna is a Medical Director at OpenBiome, a nonprofit stool bank which manufactures FMT for use in C. difficile and in support of microbiome based research. He has worked in microbial therapeutics and the FMT space for several years with interest areas in infectious disease public health surveillance, microbial virulence, transmission, and the microbiome. Prior to this he spent several years training in Public Health, Infectious Diseases and Clinical Microbiology in Melbourne, Australia.

Manoj Dadlani, CosmosID

Overcoming the Validation Challenges of a Diagnostic for SARS-CoV-2 in Stool

In addition to fever and pulmonary symptoms, SARS-CoV-2 infection frequently induces severe enteric symptoms, such as diarrhea and nausea, which can be more grave than enteric symptoms from SARS-CoV-1 and Middle East respiratory syndrome coronavirus (MERS-CoV). Recently, SARS-CoV-2 RNA has been detected in stool samples from hospitalized patients testing positive for the virus, both with and without gastrointestinal manifestations. Current literature on COVID-19 indicates that the duration of SARS-CoV-2 viral shedding from feces after negative conversion in pharyngeal swabs can range from 6 to 9.5 days, and possibly longer in some studies. However, as a sample type, stool is more complicated than a standard pharyngeal swab. To address this challenge, CosmosID has developed a real-time reverse transcriptase polymerase chain reaction (RT-PCR) assay to detect SARS-CoV-2 in stool targeting the ORF1ab and N genes. In this presentation, we will describe the methods for creating and validating the test, the controls we used, and the challenges we faced.

Bio: Mr. Manoj Dadlani serves as Chief Executive Officer at CosmosID, Inc., the Maryland based provider of industry-leading solutions for unlocking the microbiome. Previously, Mr. Dadlani served as a partner at Applied Value Group, a management consulting and investment firm, and was co-founder and CEO at Rasa Industries, Ltd., a leading beverage manufacturing company. Mr. Dadlani has substantial experience in strategy, M&A, supply chain management, product development, marketing and business development. Mr. Dadlani received his bachelor's and master's degrees in Biological Engineering from Cornell University. Services offered by CosmosID's CLIA certified and GLP laboratory cover the entire workflow from study design to sample collection, extraction, library preparation, sequencing, data analysis and publication support. CosmosID's cloud-based metagenomics application offers user-friendly access to the largest curated databases for microbial genomics, antimicrobial resistance and virulence data and has been independently validated to return metagenomic analyses at strain level resolution with industry-leading sensitivity and precision.

Katerina Papp, Water Quality R&D, Southern Nevada Water Authority

Wastewater Surveillance of SARS-CoV-2 in Southern Nevada: Challenges for Sample Collection, Processing, and Analysis

Wastewater surveillance involves monitoring various chemical or microbiological targets to gain insight into the behaviors or characteristics of a community. This tool has previously been used to identify 'hot spots' for opioid abuse and also to aid in eradicating polio. Wastewater surveillance can provide an 'early warning' signal for disease outbreaks in a community and subsequent trend analysis to understand the state of the epidemiological curve (e.g., spiking vs. waning) and/or the effects of mitigation measures (e.g., social distancing). In fact, wastewater is currently being monitored across the globe for the genetic signal of SARS-CoV-2, the RNA virus responsible for the COVID-19 global pandemic. Although primarily respiratory in nature, SARS-CoV-2 is shed in the feces of infected individuals, ultimately winding up in raw sewage. Despite the tremendous potential for wastewater surveillance of SARS-CoV-2, there are multiple challenges associated with detection of its RNA in complex wastewater matrices, including the presumed fragility of the viral particles and co-concentration of inhibitory substances.



This presentation will address a number of ongoing method development efforts at SNWA, including those related to (1) sample collection and concentration, (2) nucleic acid extraction and processing, and (3) identification of appropriate molecular assays and QA/QC measures.

Bio: Dr. Katerina Papp is a Postdoctoral Researcher in Research Microbiology at the Southern Nevada Water Authority. She earned her B.S. and Ph.D. in Environmental Microbiology at Northern Arizona University, where she studied soil microbial activity through quantitative stable isotope probing. She also studied human health microbiology at the Translational Genomic Research Institute. Now at SNWA, her research focuses on microbial source tracking and virus occurrence and removal in the natural and engineered environment. That includes monitoring for the genetic signal of SARS-CoV-2 in Southern Nevada wastewater.

Kyle Bibby, University of Notre Dame

Recent Case Studies in Wastewater Surveillance for SARS-CoV-2

The talk will briefly cover recent case studies in wastewater surveillance for SARS-CoV-2, as well as necessary future technical developments to enable application as a surveillance method.

Bio: Dr. Kyle Bibby is an Associate Professor and the Wanzek Collegiate Chair at the University of Notre Dame in the Department of Civil and Environmental Engineering and Earth Sciences. He completed his BS in Civil Engineering from the University of Notre Dame and PhD in Environmental Engineering from Yale University. He has previously won multiple professional awards, including the 2017 NSF CAREER award. Dr. Bibby currently leads multiple research projects centered around understanding microbiology relevant to protecting and improving human health and environmental quality and is an Associate Editor for the journal Microbiome.

Aparna Keshaviah, Mathematica

Testing Wastewater for SARS-CoV-2: Aligning Validation and Policy Needs

With the COVID-19 pandemic, test kit shortages have created large blind spots with respect to disease transmission. Wastewater testing provides a new way to rapidly measure the viral exposure of thousands of people in a community. But given the novelty of approach, public health and public policy officials need to be confident that the method yields reliable information. Different validation approaches provide different insights into the robustness of wastewater data for policymaking. Further, different pandemic management decisions require different levels of methodologic validation. Accordingly, researchers refining SARS-CoV-2 testing methods must consider how the data will be used. Beyond intra-lab validation (to improve viral detection and quantification), approaches to explore include inter-lab validation (such as split-sample analyses), meta-regression (to identify sample processing features associated with improved detection/quantification), and data triangulation (to contextualize and assess alignment between wastewater data and conventional community data sources).

Bio: Aparna Keshaviah is a senior statistician at Mathematica who works at the developmental cusp of emerging public health topics. She has directed research on urgent drug policy issues—spanning the opioid epidemic, marijuana legalization, and pharmaceutical drug development and safety—and her work has been widely published in leading journals such as the New England Journal of Medicine. At Mathematica, Keshaviah has been at the forefront of bringing innovative data sources, advanced analytics, and visualization tools to health policy research. In 2017, she led a highly visible symposium to explore the real-world potential of wastewater testing to support decision making around the opioid epidemic. Her work to translate the value of wastewater testing for policymakers inspired new federal funding



from the National Institute on Drug Abuse, and she has served as an expert reviewer for programs focused on translational research. Keshaviah holds a Master's degree in biostatistics from the Harvard School of Public Health.

