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BIODETECTION TECHNOLOGIES 2020

June 15-17, 2020 | Hyatt Regency Bethesda | Bethesda, MD

Advanced Technologies & Methods for Global Health & Biodefense

Conference Programs

28TH INTERNATIONAL
BIOTHREAT AND PATHOGEN DETECTION
Advanced Technologies for Detection, Diagnostics and Analytics

28TH INTERNATIONAL
POINT-OF-CARE DIAGNOSTICS FOR GLOBAL HEALTH & BIODEFENSE
Advanced Methods to Enable Effective Decision-Making

Dinner Short Courses

Dinner Short Course 1
SAMPLE PREP TECHNOLOGIES

Dinner Short Course 2
RAPID VACCINE TECHNOLOGIES

FEATURED SPEAKERS

Cory Bernhards, PhD
Research MicroBiologist, CBR, Defense Threat Reduction Agency (DTRA)

Calvin Chue, PhD
Research Biologist, Edgewood Chemical Biological Center, U.S. Army

Joany Jackman, PhD
Senior Scientist, Research & Exploratory Development, Johns Hopkins University

Michael Lochhead, PhD
Vice President & COO, MBio Diagnostics

Harshini Mukundan, PhD
Principal Investigator & Team Leader, Chemistry for Biomedical Applications, Los Alamos National Lab

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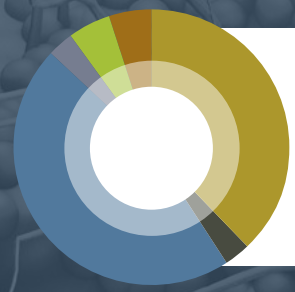

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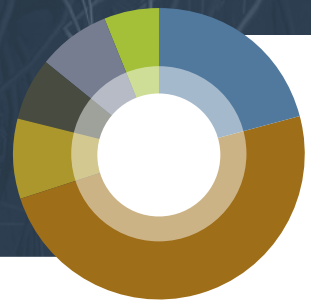

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DISTINGUISHED FACULTY

Dave Alburty, CEO, Engineering, InnovaPrep

Cory Bernhards, PhD, Research Microbiologist, CBR, Defense Threat Reduction Agency

Paul Brantmier, Program Manager, Field Operations &Training, National Strategic Research Institute, University of Nebraska

James Brayer, Associate Director, Market Development, Oxford Nanopore Technologies Inc.

Calvin C. Chue, PhD, Research Biologist, Edgewood Chemical Biological Center, U.S. Army

Michael Connolly, President, Integrated Nano-Technologies, Inc.

Christopher Cooney, PhD, Director, Engineering, Akonni Biosystems

John Dunbar, Scientist, Bioscience, Los Alamos National Lab

Claudia Gärtner, CEO, microfluidic ChipShop GmbH

David Hirschberg, Founder, Catalyst; CEO, RAIN; Afilliate Faculty, School of Engineering at University of Washington Tacoma

Randy Hofmann, PhD, Principal Scientist, Group Leader, Edgewood Chemical Biological Center, U.S. Army

Joany Jackman, PhD, Senior Scientist, Research & Exploratory Development, Johns Hopkins University

Venkateswaran Kodumudi, PhD, Chief Scientist, Tetracore

Michael J. Lochhead, Vice President & COO, MBio Diagnostics Inc.

Aaron M. Mohs, PhD, Associate Professor, University of Nebraska Medical Center

Gabriel Montaño, PhD, Professor and Department Chair, Department of Applied Physics and Materials Science; Chief Scientist, Center for Materials Interfaces in Research and Applications (¡MIRA!); Diversity Fellow, Northern Arizona University

Harshini Mukundan, PhD, Principal Investigator & Team Leader, Chemistry for Biomedical Applications, Los Alamos National Lab

Pejman Naraghi-Arani, PhD, Senior Advisor and Subject Matter Expert – Wearable Sensors and Diagnostics (Contractor), Division of Research, Innovation, and Ventures (DRIVe), Biomedical Advanced Research and Development Authority (BARDA), Office of Assistant Secretary for Preparedness and Response (ASPR), US Department of Health & Human Services (HHS)

John Polk, Operations and Analysis Section Chief, National Biosurveillance Integration Center, U.S. Department of Homeland Security

Matthew T. Quinn, Senior Advisor, Health Technology, Health Resources & Services Administration

Neeraj Rao, General Manager, ThreatSEQ, Battelle

Joseph Russell, PhD, Senior Scientist, Global Health Surveillance & Diagnostics, MRIGlobal

Vishaka Santosh, PhD, Postdoctoral Fellow, CCDC Chemical Biological Center, Aberdeen Proving Ground

Mary Sproull, Biologist, Radiation Oncology Branch, NIH/NCI/ROB

Zachary Stromberg, PhD, Postdoc Fellow, Los Alamos National Laboratory

Chris Taitt, PhD, Research Biochemist, Center for Biomolecular Science & Engineering, U.S. Naval Research Lab

Shashi Tripathi, CTO, ImpediMed

David Ussery, PhD, Director ArC GEM & Professor, Biomedical Informatics, University of Arkansas for Medical Sciences

Willy Valdivia-Granda, Founder & CEO, Orion Integrated Biosciences, Inc.

Neeraja Venkateswaran, PhD, Senior Scientist, R&D, Tetracore, Inc.

Justin Yang, Program Analyst, Biomedical Advanced R&D Authority, U.S. Department of Health & Human Services

Charles Young, Chief Scientist, Applied Biology Group, Johns Hopkins University

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DINNER SHORT COURSES*

JUNE 16, 2020 | 6:00-8:00 pm

Dinner Short Course 1
SAMPLE PREP TECHNOLOGIES

Dinner Short Course 2
RAPID VACCINE TECHNOLOGIES

TUESDAY, JUNE 16 6:00-8:00 PM

Dinner Short Course 1: Sample Prep Technologies

Instructors:

Dave Alburty, CEO, Engineering, InnovaPrep

James Brayer, Associate Director, Market Development, Oxford Nanopore Technologies

Venkateswaran Kodumudi, PhD, Chief Scientist, Tetracore

null

Dinner Short Course 2: Rapid Vaccine Technologies

Instructor:

Willy Valdivia-Granda, Founder & CEO, Orion Integrated Biosciences, Inc.

The need for the rapid formulation of novel vaccines in response to emerging pathogens is critical to public health and safety. The vaccines developed should elicit protective immune responses and be unaffected by pre-existing immunity to vaccine components. In addition, these treatments should be amenable to combination and multi-agent formulation, and should be safe for all populations and the environment.

Topics to be covered include:

- Status of Vaccines for Ebola
- Vaccines for Bacterial Pathogens
- Advances in Rational Vaccine Design and Development Role of Adjuvants in Developing More Effective Vaccines
- Veterinary Vaccines and New Generation of the DIVA-Concept
- Advances in Vaccine Manufacturing
- Strategies for Vaccine Licensing
- FDA's Regulatory Policy
- Initiatives for Funding Vaccine Development Government Vaccine Portfolio

**Separate registration required.*

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Register and submit by May 8, 2020

ABOUT THE EVENT

The 28th International Biodetection Technologies 2020 conference is an internationally recognized meeting for experts in detection & identification of biological threats. The event will address the key topics in detection and present the latest R&D and technological innovation in ready-to-market systems. In addition, this meeting focuses on the latest strategies to overcoming the hurdles to the identification of global biological threats and translational gaps in bringing technologies from lab to field. This conference will feature stimulating discussions, perspectives of end users, and high quality case studies, and provides the opportunity to network with the leading experts in biodefense from around the globe.

HOTEL & TRAVEL

Conference Venue and Hotel:
Hyatt Regency Bethesda
1 Bethesda Metro Center
Bethesda, MD 20814
Tel: 301-657-1234

Reservations: Go to the travel page of BiodetectionTechnologies.com
Discounted Room Rate: $249 s/d
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CONFERENCE AT-A-GLANCE

	DAY ONE Monday, June 15, 2020	DAY TWO Tuesday, June 16, 2020	DAY THREE Wednesday, June 17, 2020
MORNING	BIOTHREAT AND PATHOGEN DETECTION		POINT-OF-CARE DIAGNOSTICS FOR GLOBAL HEALTH AND BIODEFENSE
AFTERNOON	BIOTHREAT AND PATHOGEN DETECTION	POINT-OF-CARE DIAGNOSTICS FOR GLOBAL HEALTH AND BIODEFENSE	
EVENING	Dinner Short Course 1 SAMPLE PREP TECHNOLOGIES Dinner Short Course 2 RAPID VACCINE TECHNOLOGIES		

MONDAY, JUNE 15

7:30 am Registration and Morning Coffee

IDENTIFICATION & MANAGEMENT OF EMERGING AND REEMERGING PATHOGENS

8:25 Chairperson's Opening Remarks

Cory Bernhards, PhD, Research MicroBiologist, CBR, Defense Threat Reduction Agency (DTRA)

8:30 Diagnostics in Resource-Limited Environments – Lessons Learned over the Past 3 Years

Chris Taitt, PhD, Research Biochemist, Center for Biomolecular Science & Engineering, U.S. Naval Research Lab

In many developing countries, there is a lack of reliable diagnostic tests that have been adequately characterized for sensitivity and specificity in austere environments. Without the knowledge of how tests perform in challenging environments, even the most facile tests may fail to provide accurate information when deployed to remote locations. In collaboration with clinical researchers in Sierra Leone, West Africa, we have characterized how sample type affects sensitivity and specificity in malaria PCRs and have determine performance characteristics of multiple assay types under conditions of high heat, high humidity, and minimal user training. We will also describe challenges inherent in implementation of stringent, technically challenging gold standard tests (microbiological, molecular) under these conditions.

9:00 Molecular Taxonomic Profiling for Known and Unknown Biothreat Characterization

Willy Valdivia-Granda, Founder & CEO, Orion Integrated Biosciences, Inc.

With more than 1,500 distinct infectious pathogens, tracking and ranking the risk of known and unknown biothreats is a challenging issue for national security stakeholders. Here we introduce a component of RIGEL biodefense enterprise named MTP which includes a genomic-database and an analytical system to process genomic information from different sequencing platforms.

9:30 ThreatSEQ: DNA Screening as a Service

Neeraj Rao, General Manager, ThreatSEQ, Battelle

Due to the dual-use nature of emerging biotechnology, biosecurity is a necessary component for the synthetic biology industry which routinely produces synthetic DNA. Battelle has connected the challenges associated with enabling the responsible development of synthetic biology with our unique position to provide an economically and technically sound biosecurity solution. The result is the ThreatSEQ DNA screening web service for the detection and characterization of "sequences of concern" in genomic data. This technology gives the synthetic biology industry a powerful new resource to reduce the risk that dangerous organisms will be created through gene synthesis, accidentally or deliberately. The platform accomplishes the outcome by streamlining the sequence review process through an industry-oriented user interface to review screening results that displays high-quality metadata and a graphical representation of the genomic context. In this presentation, we will highlight the development of the application, the current mode of operation, and discuss relevant policy and regulatory issues associated with DNA sequence screening.

10:00 Networking Coffee Break

10:30 A Multi-Parametric Approach towards Biological Threat Detection

Neeraja Venkateswaran, PhD, Senior Scientist, R&D, Tetracore, Inc.

Rapid detection entails testing for agent-related specific protein markers, toxins, nucleic acids, metabolites, etc. in various test formats, devices, and sensors. The analysis of a suspected sample using crossover methodologies using a multi-parametric approach where the test analytes are independent of each other and also highly co-related can provide a definitive result. This kind of independently verified testing provides high confidence in either the positive or negative detection in any high consequence situation. The utilization of antibody-based and nucleic acid amplification-based tools has also improved time to screening compared to classical microbiological culture methods. Novel technologies made with ease of use in the field in mind have made complex skill-based technologies equally adaptable to users at high, moderate, and low skill levels. An example of the implementation of this approach for the detection of bacterial toxins will be discussed in the presentation.

11:00 One Stop Shop: Lipid Membranes for Pathogenic Biomarker Detection

Gabriel Montaño, PhD, Professor and Department Chair, Department of Applied Physics and Materials Science; Chief Scientist, Center for Materials Interfaces in Research and Applications (¡MIRA!); Diversity Fellow, Northern Arizona University

In this talk, I will present examples of using model lipid membranes as detection platforms for amphiphilic pathogen-associated molecular patterns (PAMPs). Single-step detection platforms are demonstrated that exhibit high sensitivity. In such platforms, biotargets are added to model membranes and samples are characterized via surface analysis techniques such as surface plasmon resonance fluorescence. In addition to high-sensitivity detection, it is possible to learn about how targets interact with membranes. In some cases, such as lipopolysaccharide (LPS), unusual patterns of membrane interaction (hole formation) are observed that infer useful information about LPS-membrane interaction with potential physiological ramifications. I will discuss these novel interactions and demonstrate an ability to exploit such interactions for biomaterials applications.

11:30 Improved Detection of Low-Abundance Bacterial Pathogens in Aerosol Samples

John Dunbar, Scientist, Bioscience, Los Alamos National Lab

To detect pathogens at low abundance in aerosol samples by PCR, highly efficient extraction of nucleic acids is crucial to avoid false negatives. We addressed this problem by evaluating the performance of six DNA extraction methods for recovery of target-specific DNA from samples with four bacterial agents at low abundance. These methods differed in approach for cell disruption, DNA capture, and DNA purification. The six methods varied 1000-fold in the recovery of DNA from spores or cells of surrogates of *Bacillus anthracis*, *Yersinia pestis*, *Burkholderia pseudomallei*, and *Francisella tularensis*. The top-performing method consistently recovered DNA sufficient for detection of bacterial targets on filters after 24-hr outdoor aerosol collection.

12:00 pm Sponsored Presentation *(Opportunity Available)*

12:30 Luncheon Presentation *(Sponsorship Opportunity Available)* **or Enjoy Lunch on Your Own**

1:00 Session Break

ADVANCES IN NUCLEIC ACID TECHNOLOGIES & NEXT-GENERATION SEQUENCING

1:55 Chairperson's Remarks

Willy Valdivia-Granda, Founder and CEO, Orion Biosciences, Inc.

2:00 Rapid and Fieldable Biothreat Detection Using Nanopore Sequencing

Cory Bernhards, PhD, Research Microbiologist, CBR, Defense Threat Reduction Agency

Rapid and accurate biological identification technologies are critically needed in the field, especially for unknown, emerging, and genetically modified threats. Nanopore sequencing technology enables the ability to conduct rapid whole genome analysis in places where more traditional next-generation sequencing technologies cannot. We have developed nanopore sequencing workflows for the analysis of air filter samples from the NYC Subway as well as CENTAUR sample analysis facilities in South Korea. Separately, for far-forward sequencing applications, we have demonstrated raw sample to result reporting in under 35 minutes onsite during military exercise scenarios. Our workflow uses offline bioinformatics software that we have developed for rapid and automated metagenomic analysis. One of our current focuses is to add the ability to rapidly detect RNA viruses in the field using direct RNA nanopore sequencing. We also continue to evaluate other emerging nanopore sequencing-related technologies for incorporation into our workflows in order to simplify procedures, increase portability, and improve cost-efficiency. In addition this presentation will give an update on our work in developing a detection assay for the novel coronavirus using nanopore sequencing.

2:30 Overview of Recent Advances in Nanopore Sequencing and the Applications It Is Enabling

Sponsored by NANOPORE

James Brayer, Associate Director, Market Development, Oxford Nanopore Technologies Inc.

Oxford Nanopore Technologies (ONT) has developed a disruptive mobile platform that is enabling researchers to generate NGS data for novel applications where portability, simplicity and real time data acquisition are critical. Learn about recent advancements to our platform where increased accuracy and output will further expand the applications that our devices will enable. ONT has developed new chemistry and library prep kits that will improve our raw accuracy and simplicity to go from biological samples to sequence ready molecules.

3:00 Opening Refreshment Break in the Exhibit Hall with Poster Viewing

RAPID AND FUTURE TECHNOLOGIES FOR BIODETECTION

4:00 BARDA Landscape for Biosensors and Diagnostics for the Home

Justin Yang, Program Analyst, Biomedical Advanced R&D Authority, U.S. Department of Health & Human Services

The Biomedical Advanced, Research and Development Authority (BARDA) invests in technologies that address natural and man-made threats. From the development of a radiation biodosimeter to a blood screening tool for chemical agent exposure, BARDA is the US Government late-stage and advanced development arm of research and development (R&D). Over the past 12+ years, BARDA has brought to market over 52 FDA approved products.

4:30 PANEL DISCUSSION: Avoiding the "Valley of Death" and Examples of Best Practices towards Surviving the Late Stages of Development through Early Commercialization

Moderator: Calvin C. Chue, PhD, Research Biologist, Edgewood Chemical Biological Center, U.S. Army

Multiple fields experience the same phenomenon where many innovative ideas may gain initial support, but few make it to sustainable commercial success. This so-called "valley of death" can be surmounted with the right partnerships, right metrics and right requirements. This panel will feature examples of success working with the US Government Chem Bio defense community to bring products to commercialization.

5:30 Welcome Reception in the Exhibit Hall with Poster Viewing

6:30 Close of Day

TUESDAY, JUNE 16

8:00 am Breakfast Roundtable Discussions

RAPID AND FUTURE TECHNOLOGIES FOR BIODETECTION

8:55 Chairperson's Remarks

Chris Taitt, PhD, Research Biochemist, Center for Biomolecular Science & Engineering, U.S. Naval Research Lab

9:00 Blindspot: A Novel Multiplex Lateral Flow Immunoassay Format for Rapid Evaluation of Results Potentially Using a Cell Phone Application

Randy Hofmann, PhD, Principal Scientist, Group Leader, Edgewood Chemical Biological Center, U.S. Army

Lateral flow immunoassays (LFIs) are the primary detection component of many of the Department of Defense's (DoD) fielded biological warfare agent (BWA) detection systems. LFIs are simple devices used in field forward settings to detect the presence of a target biological agent in a sample matrix without the need for specialized and costly equipment. The advantages of LFIs are: they are simple, easy to use even by nontechnical persons, hand-held, easily transported, do not require additional reagents, relatively inexpensive, have long shelf life and are easy to manufacture. Data from additional ongoing work and development of the software and reader will be presented.

9:30 Remote and Automated Biological Threat Detection with the BioACER Device

Vishaka Santosh, PhD, Postdoctoral Fellow, CCDC Chemical Biological Center, Aberdeen Proving Ground

The BioACER (Biological Automated Collector/Detector for Expeditionary Reconnaissance) device is being developed for automated sample collection, preparation, identification, and reporting of biological aerosols. This unmanned device will allow for low cost, rapid, and accurate identification of biological threats, while eliminating risk of exposure to operators.

10:00 ROCSAFE: A UAV-Based Lab-on-a-Chip System for Remote Pathogen Detection

Claudia Gärtner, CEO, microfluidic ChipShop GmbH

We present a microfluidic lab-on-chip system which has been integrated into an unmanned aerial vehicle and which can perform remote sampling and analysis of pathogens. The restrictions on size and weight on these platforms, together with the need for a rugged system layout, make lab-on-a-chip technologies the prime candidates to be implemented on such a drone platform.

10:30 Coffee Break in the Exhibit Hall with Poster Viewing

11:15 Mercury Lab – Bringing the Lab to the Sample

Joseph Russell, PhD, Senior Scientist, Global Health Surveillance & Diagnostics, MRIGlobal

MRIGlobal has developed a purpose-built platform that provides all the necessary operational equipment for genomics-based biosurveillance in a human-centered laboratory-workbench design such that rapid, reproducible deployment of advanced genomic technologies to field-forward locations is no longer strategically unfeasible. This mobile laboratory, Mercury Lab, is a first-of-its-kind product that was built to lower the barrier-to-entry of modern molecular hardware where it is needed most.

11:45 Integration of a Comprehensive Sample Preparation Process and PCR in a Single Low-Cost Disposable

Michael Connolly, President, Integrated Nano-Technologies, Inc.

INT has been developing a fully automated PCR-based identification system. The system utilizes a novel fluidic cartridge to incorporate comprehensive sample extraction and nucleic acid purification capability. Sample disruption is carried out using a guanidine hydrochloride buffer and ultrasonication. Nucleic acids are purified using a combination of magnetic separation/concentration and a desalting column. PCR is carried out in the cartridge and detection of amplicons is completed using an electrical sensor array. The system incorporates positive and negative controls and utilizes a nested detection process to minimize false positives and false negatives. Performance data from the system will be presented.

12:15 pm Close of Biothreat and Pathogen Detection

TUESDAY, JUNE 16

12:00 pm Registration

ADVANCES IN FIELDABLE TECHNOLOGIES AND ASSAYS

1:25 Chairperson's Remarks

Harshini Mukundan, PhD, Principal Investigator & Team Leader, Chemistry for Biomedical Applications, Los Alamos National Lab

1:30 Information Collection, Analysis, Report Generation and Distribution

John Polk, Operations and Analysis Section Chief, National Biosurveillance Integration Center, U.S. Department of Homeland Security

2:00 Rethinking Our Approach to Fieldable Infectious Disease Diagnostics

Charles Young, Chief Scientist, Applied Biology Group, Johns Hopkins University

2:30 Sample-to-Answer Genotyping of Drug-Resistant TB Using a Lab-on-a-Film Test

Christopher Cooney, PhD, Director, Engineering, Akonni Biosystems

This talk will describe a sample-to-answer system that uses gel drop arrays to detect mutations in drug-resistant strains of Mycobacterium tuberculosis. These hemispherical porous gel drops are printed on off-the-shelf films and made of flexible laminates that can be produced with reel-to-reel manufacturing.

3:00 Presentation to be Announced

3:30 Refreshment Break in Exhibit Hall with Poster Viewing

4:15 Point-of-Care Platform for Multiplexed Host-Response Immunoassays

Michael J. Lochhead, Vice President & COO, MBio Diagnostics Inc.

MBio Diagnostics has developed a portable cartridge and reader system that delivers multiplexed biomarker immunoassays with a rapid, simple workflow. The technology is described and examples are provided demonstrating system performance for host response biomarker panels associated with acute infection and sepsis. The MBio platform technology is uniquely positioned to bring multiplexed immunoassays to point-of-care and resource-limited settings.

4:45 Expanding Access to Point-of-Care Diagnostics to Rural and Underserved Places – Experiences from the Field

Matthew T. Quinn, Senior Advisor, Health Technology, Health Resources & Services Administration

Realizing the promise of new point-of-care diagnostic technologies requires their tailoring to operate in rural, austere, and otherwise underserved locations and, often, with a very different complement of healthcare providers and other caregivers. This session will describe efforts to expand the use of telehealth and other point-of-care diagnostic technologies in underserved and under-resourced settings, including examples of what has worked and what has not.

5:15 Dinner Short Course Registration

6:00 Dinner Short Courses*

- **SC1: Sample Prep Technologies**
- **SC2: Rapid Vaccine Technologies**

**Separate registration required, see page 4 for details*

WEDNESDAY, JUNE 17

8:30 am Morning Coffee

ADVANCES IN FIELDABLE TECHNOLOGIES AND ASSAYS

8:55 Chairperson's Remarks

Joany Jackman, PhD, Senior Scientist, Research & Exploratory Development, Johns Hopkins University

9:00 Challenges in Adaptation of Radiation Biodosimetry Diagnostics to the Field

Mary Sproull, Biologist, Radiation Oncology Branch, NIH/NCI/ROB

Use of radiation biodosimetry diagnostics for mass casualty screening of large populations has been identified as critical for emergency response during disasters involving radiation exposure. Our current study examines application of radiation dose prediction algorithms to a more heterogeneous population using a diverse panel of biomarkers. Our findings illustrate challenges and potential solutions for adapting dose prediction algorithms for mass screening in the field.

TOOLS AND TECHNOLOGY AT THE POINT-OF-CARE

9:30 Universal Diagnostics for Rapid Triage at the Point of Care

Harshini Mukundan, PhD, Principal Investigator & Team Leader, Chemistry for Biomedical Applications, Los Alamos National Lab

The human innate immune response is capable of universal and rapid recognition of all pathogens. Mimicking this recognition in the laboratory can allow for universal diagnosis of all infection. Our team has developed novel assays for the tailored recognition of pathogen and host biomarkers that are involved in innate immunity. In addition, we have developed a fieldable and ultrasensitive waveguide-based biosensor, with associated sample processing methods for use in remote regions, in order to quickly and effectively guide decision making. Application of these technologies, challenges therein and outcomes of field validation studies will be presented.

10:00 Networking Coffee Break

10:30 BARDA's Investments in POC and On-Person Dx

Pejman Naraghi-Arani, PhD, Senior Advisor and Subject Matter Expert – Wearable Sensors and Diagnostics (Contractor), Division of Research, Innovation, and Ventures (DRIVe), Biomedical Advanced Research and Development Authority (BARDA), Office of Assistant Secretary for Preparedness and Response (ASPR), US Department of Health & Human Services (HHS)

The Biomedical Advanced Research & Development Authority's new Division of Research, Innovation, and Ventures in the Department of Health and Human Services is funding development and testing of wearable technologies for pre-symptomatic diagnosis of disease. We are funding multiple projects seeking to improve healthcare and health outcomes by enabling Americans to monitor their own health.

11:00 Using Bio Impedance Spectroscopy to Detect Lymphedema and CHF

Shashi Tripathi, CTO, ImpediMed

We have developed a device which, using the Bio Impedance Spectroscopy (BIS), passes 256 different MHz to a human body which is noninvasive in nature. Using this, we can calculate intra-cellular and extra-cellular fluid. Using this information, we can detect lymphedema and CHF earlier, thus preventing lymphedema for the cancer and hospitalization for CHF patients. This presentation will discuss the details around this.

11:30 RAIN Incubator Year 3…Developing Detection Technologies In a DIY Lab: Lessons That Can Be Applied to Training, Operation and Threat Detection in Resource-Limited Environments

David Hirschberg, Founder, Catalyst; CEO, RAIN; Afilliate Faculty, School of Engineering at University of Washington Tacoma

RAIN is a 501c3 non-profit non university-affiliated biotechnology incubator with programs to train and educate future scientists. It has created 4 laboratories to support the needs of growing companies. In addition, its educational and outreach initiatives create awareness within the community of its scientific activities. The lab management policies come from RAIN leaderships' past experiences in academic, industry, and government labs, with modifications made to adapt to lower resources without compromising safety or security. As a result, RAIN's labs have more in common with Do It Yourself (DIY) labs than traditional institutional labs. RAIN's environment allows communication with other entities and monitoring of safety and ethical practices in this rapidly developing sector.

12:00 pm Enjoy Lunch on Your Own

OPTIMIZING PERFORMANCE OF TRADITIONAL POINT-OF-CARE DETECTION

1:40 Chairperson's Remarks

David Hirschberg, Founder, Catalyst; CEO, RAIN

1:45 Tools and Resources to Help Navigate the Pathway to Successful Development of Point-of-Care Technologies

Joany Jackman, PhD, Senior Scientist, Research & Exploratory Development, Johns Hopkins University

2:15 Rapid, High-Throughput Sequence-Based Prediction of BioThreats

David Ussery, PhD, Director ArC GEM & Professor, Biomedical Informatics, University of Arkansas for Medical Sciences

Knowing whether a sample is safe or contains a potential pathogen is essential in potential bioterrorism incidents. Sequencing everything and comparing against large databases are both slow and expensive. By using third-generation sequencing and looking for a relatively small set of known protein functional domains of toxins, we can detect potential toxins in near-real time - in seconds, as the sample is being sequenced.

2:45 Networking Refreshment Break

3:00 Ratiometric Dyes for Fluorescent Sensor Array-Enabled Bacterial Pathogen Identification and Classification

Aaron M. Mohs, PhD, Associate Professor, University of Nebraska Medical Center

Timely and efficient identification of pathogenic microorganisms is of high importance for public health and safety. Current bacterial pathogen analysis relies on phenotypic identification of the bacterial species by Gram staining and culturing that are sometimes inconclusive, time-consuming, and equipment-demanding, which delay treatment and limit their application to laboratory settings. Most of the currently developed sensing methods are based on optical and/or electrochemical techniques, where selectivity is achieved by using antibodies, their fragments, natural or engineered peptides, or aptamers. Important limitations for using these elements as a part of the sensor are cost, stability and adaptability: they often require special handling and are specific to only a narrow range of analytes. In our work, we present a sensor array for multivariate analysis based on small-molecule ratiometric fluorescent dyes. We demonstrate the sensor's ability to differentiate bacterial species and recognize their Gram status. We also expand the sensor's functionality to include analysis of mixed bacterial samples.

3:30 Development of a Probe Pipeline for Viral Diagnostics

Zachary Stromberg, PhD, Postdoc Fellow, Los Alamos National Laboratory

Improving pathogen coverage is essential for optimizing point-of-care diagnostics. We have developed a viral mosaic probe pipeline that generates high-coverage probe sequences for detection of highly diverse and rapidly mutagenic viruses. In addition, the pipeline incorporates thermodynamics for multiplex applications. The molecular probes generated are compatible with traditional molecular diagnostic instruments and are currently used in our biosensor for ultra-sensitive detection of influenza viruses.

4:00 The Training of Biosurveillance

Paul Brantmier, Program Manager, Field Operations &Training, National Strategic Research Institute, University of Nebraska

This presentation will provide insights and highlights from training biosurveillance technologies, techniques, and associated activities for hundreds of soldiers, sailors, airmen, marines, civilians, and international partners domestically and abroad.

4:30 Close of Summit

BIODETECTION TECHNOLOGIES 2020

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Monday - Tuesday June 15-16, 2020	Tuesday - Wednesday June 16-17, 2020
C1: Biothreat and Pathogen Detection	C2: Point-of-Care Diagnostics for Global Health & Biodefense

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One short course	$549	$349

Tuesday, June 16, 2020 | 6:00 - 8:00 PM (Dinner Provided)
SC1: Sample Prep Technologies
SC2: Rapid Vaccine Technologies

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