

SAVE THE DATE!  
JUNE 27-29, 2018

THIRD ANNUAL

# BIODEFENSE WORLD SUMMIT 2017

June 26-29, 2017 | Alexandria, VA



Cover

Conference-at-a-Glance

**Biodetection Technologies:**  
Biothreat and Pathogen Detection

**Biodetection Technologies:**  
Point-of-Care for Biodefense

**Biosurveillance Integration**

**Sample Prep Technologies**

**Rapid Detection for Food Safety**

Dinner Workshop

Sponsor & Exhibit Opportunities

Hotel & Travel Information

Registration Information

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[BiodefenseWorldSummit.com](http://BiodefenseWorldSummit.com)

Empowering the defense community to recognize, assess and act on biological threats

## KEYNOTE SPEAKERS:



**John Besser, Ph.D.,**  
Deputy Chief of the  
Enteric Diseases, Centers  
for Disease Control &  
Prevention



**Kurt Schaecher, Ph.D.,**  
Deputy Director,  
USAMRIID, U.S. Army  
Medical Research  
Institute of Infectious  
Diseases



**Robert Duncan, Ph.D.,**  
Principal Investigator,  
DETTD, FDA/CBER



**Michael Walter, Ph.D.,**  
BioWatch Program  
Manager, U.S. Department  
of Homeland Security



**Luther Lindler, Ph.D.,**  
Senior Scientist (ST),  
Biological Programs, U.S.  
Department of Homeland  
Security



**Charles Young, Ph.D.,**  
Chief Scientist, Applied  
Biology Group, Johns  
Hopkins University  
Applied Physics Lab



**Helen M. Moore, Ph.D.,**  
Chief, Biorepositories and  
Biospecimen Research  
Branch, National Cancer  
Institute

CO-LOCATED WITH:

FOURTH ANNUAL

## Rapid Detection for Food Safety

ADVANCES IN GENOMICS, CAPTURE TECHNOLOGIES  
& HIGH THROUGHPUT DETECTION



25TH INTERNATIONAL

**Biodetection Technologies:**  
BIOTHREAT AND PATHOGEN DETECTION



25TH INTERNATIONAL

**Biodetection Technologies:**  
POINT-OF-CARE FOR BIODEFENSE



6TH INTERNATIONAL

**Biosurveillance Integration**  
INTEGRATED MANAGEMENT OF THREATS  
TO PUBLIC HEALTH & SAFETY



11TH INTERNATIONAL

**Sample Prep Technologies**  
SAMPLE PREPARATION FOR VIRUS,  
TOXIN & PATHOGEN DETECTION &  
IDENTIFICATION

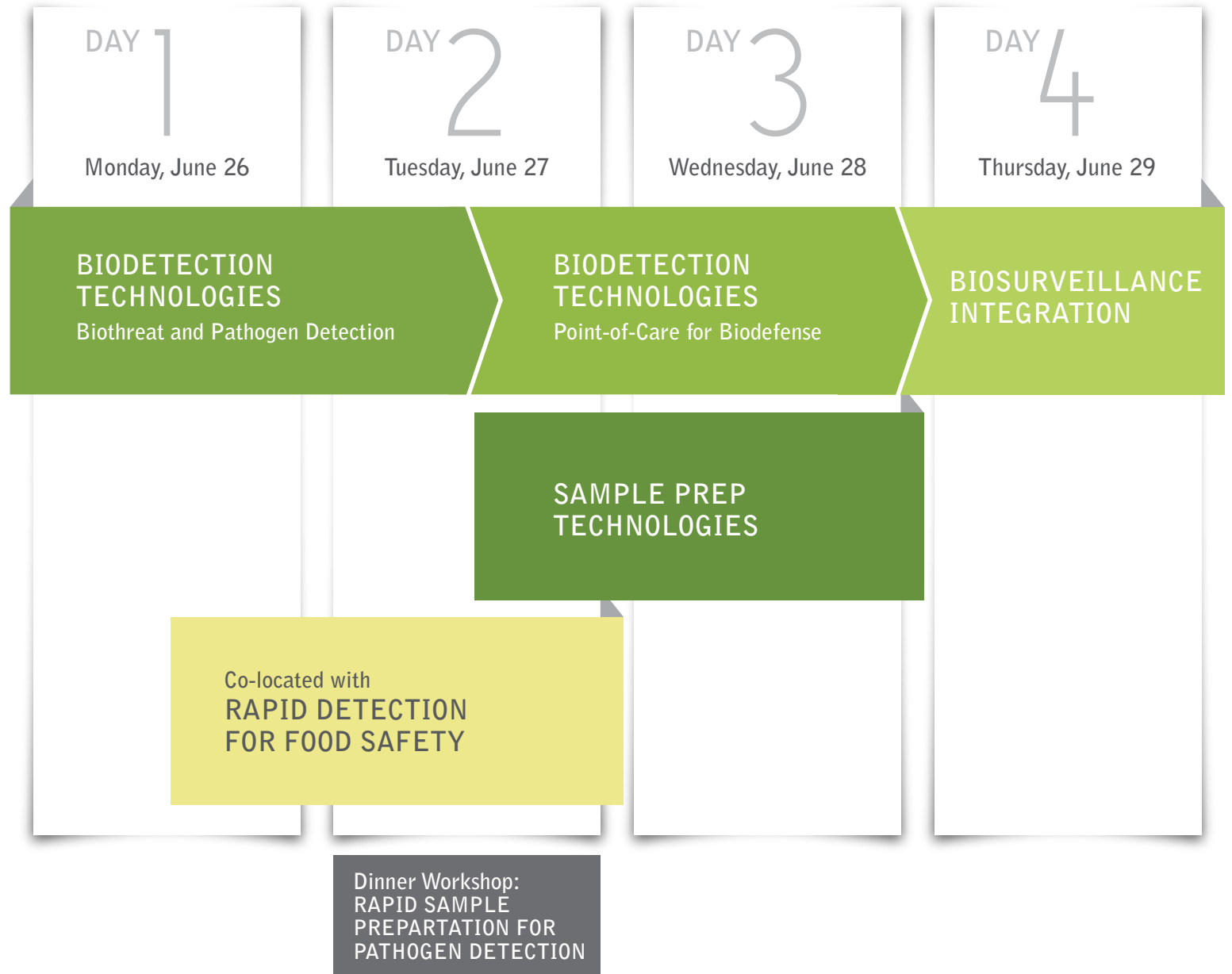
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# Conference-at-a-Glance



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# Dinner Workshop\*

TUESDAY, JUNE 27, 2017 | 5:45 – 8:45 PM

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### Conference-at-a-Glance

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## Rapid Sample Preparation for Pathogen Detection

Rapid Sample Preparation for Pathogen Detection This workshop will discuss sample preparation technologies for detection, identification and analysis of biomedical, biological and chemical agents, biothreats in point-of-care, laboratory and field settings. It will review the novel and rapid technologies for sample preparation, application of analytical strategies and automation in biodetection.

### Topics to be Covered Will Include:

- Sampling and Analysis Strategies
- Sample Prep Advantages
- Some Lessons Learned the Hard Way
- Successful Case Study – Environmental
- Automation for Biodetection
- Have a Clear Goal and a Plan
- Choose your Gear with the End in Mind

### Instructor:

**Dave Alburty, Chief Executive Officer, InnovaPrep, LLC**

Mr. Alburty has over twenty years experience in the Aerosol Research Industry. Beginning at Midwest Research Institute (MRI) in Kansas City his work as a staff research scientist centered on aerosol studies in environmental and biodefense applications. After serving fifteen years at MRI, Dave founded an aerosol science and engineering R&D test and evaluation/product development lab in Drexel Missouri. AlburtyLab offers third party validation to developers of many large-scale Homeland Security and Department of Defense projects as well as various commercial products.

Through his work in the biodefense industry, Dave recognized a missing technology between bio-collection and rapid biodetection/identification. That link is the advancement of sample preparation and biological concentration technologies. Through internal research and development projects at AlburtyLab, The InnovaPrep System was developed to fulfill that need. InnovaPrep LLC was subsequently launched in June 2009 as a manufacturer and integrator of biological sampling and concentration systems and solutions.

\* Separate registration required for workshop

## SPONSORSHIP & EXHIBIT OPPORTUNITIES

Cambridge Healthtech offers comprehensive packages that can be customized to your budget and objectives. Sponsorship allows you to achieve your goals before, during, and long after the event. Packages may include presentations, exhibit space and branding, as well as the use of delegate lists. Signing on early will maximize your exposure to qualified decision-makers and drive traffic to your website in the coming months.

### Podium Presentations – Available within Main Agenda!

Showcase your solutions to a guaranteed, targeted audience through a 15- or 30-minute presentation during a specific conference program, breakfast, lunch, or separate from the main agenda within a pre-conference workshop. Package includes exhibit space, on-site branding, and access to cooperative marketing efforts by Knowledge Foundation. For the luncheon option, lunches are delivered to attendees who are already seated in the main session room. Presentations will sell out quickly, so sign on early to secure your talk!

### Invitation-Only VIP Dinner/Hospitality Suite

Select specific delegates from the pre-registration list to attend a private function at an upscale restaurant or a reception at the hotel. From extending the invitations, to venue suggestions, Knowledge Foundation will deliver your prospects and help you make the most of this invaluable opportunity.

### One-on-One Meetings

Select your top prospects from the pre-conference registration list. We will reach out to your prospects and arrange the meeting for you. A minimum number of meetings will be guaranteed, depending on your marketing objectives and needs. A very limited number of these packages will be sold.

### Exhibit

Exhibitors will enjoy facilitated networking opportunities with qualified delegates, making it the perfect platform to launch a new product, collect feedback, and generate new leads. Exhibit space sells out quickly, so reserve yours today!

### Additional branding and promotional opportunities are available, including:

- Conference Tote Bags
- Literature Distribution (Tote Bag Insert or Chair Drop)
- Badge Lanyards
- Program Guide Advertisement
- Padfolios and More...

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For more information, please contact:

**Sherry Johnson**

**Business Development Manager**

**781-972-1359 | [sjohnson@healthtech.com](mailto:sjohnson@healthtech.com)**

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25th International

# Biodetection Technologies:

## Biothreat and Pathogen Detection



**MONDAY, JUNE 26, 2017**

**7:00 am Registration and Morning Coffee**

### ADVANCES IN NUCLEIC ACID TECHNOLOGIES & NEXT-GENERATION SEQUENCING

**8:25 Chairperson's Opening Remarks**

*Alina Deshpande, Ph.D., Group Leader, Biosecurity and Public Health, Bioscience Division, Los Alamos National Laboratory*

**8:30 OPENING KEYNOTE PRESENTATION: Rapid Surveillance of the Ebola Genome Sequence with Microarray Technology**

*Robert Duncan, Ph.D., Principal Investigator, DETTD, FDA/CBER*  
RNA genome viruses like Ebola acquire nucleotide changes in their genome that can alter pathogenesis, detection and immune response. The resequencing microarray technology enables rapid determination of genome sequence of the virus in a blood sample to identify the source of infection, track the epidemic and detect disruptive alterations. Evaluation of the performance of the resequencing microarray with multiple species of Ebola virus will be presented.

**9:00 Nuclease-Activated Probes for Rapid, Target-Specific Detection of Bacterial Pathogens**

*James McNamara, Ph.D., Associate Professor, Internal Medicine, University of Iowa*  
Diagnosis of many bacterial infections currently relies on time-consuming culture-based assays. With quenched fluorescent oligonucleotide probes that are selectively activated by nucleases of target bacterial pathogens, we have developed rapid assays for the detection of various high-impact bacterial pathogens. Applications include noninvasive optical imaging of *S. aureus* infections, and *in vitro* detection of *S. aureus* bacteremia and *E. coli* urinary tract infections. Considering the ubiquitous and diverse nature of nucleases, this approach has potential as a platform technology for bacterial infectious diseases.

**9:30 Site-Specific Conjugation to Antibodies and Antibody Fragments via the Conserved Nucleotide Binding Site (NBS) for Rapid Assay Development**

*Nathan J. Alves, Ph.D., Assistant Professor, Indiana University School of Medicine*  
The nucleotide binding site (NBS) is a binding pocket located between the heavy and light chains of the variable antibody Fab fragment that is conserved across

both antibody isotype and species of origin. Utilizing a small molecule which binds specifically to the NBS, a site-specific photo-crosslinking technique was developed to readily functionalize antibodies allowing for oriented antibody immobilization to sensor surfaces as well as functionalization with: fluorescent probes, affinity molecules, nanoparticles, peptides, and other diverse reporter molecules.

**10:00 Networking Coffee Break**

### IDENTIFICATION & MANAGEMENT OF EMERGING AND RE-EMERGING PATHOGENS

**10:30 Developing FDA-Cleared Clinical Diagnostic Systems to Address the Need during a Public Health Emergency – HHS/ASPR/BARDA Chem-Bio-Rad-Nuc, Pandemic Influenza, and Emerging Infectious Disease Diagnostics Initiatives**

*Donna Boston, Project Officer, U.S. Department of Health and Human Services (HHS), BARDA*

Early and accurate diagnosis can facilitate the provision of the correct antibiotic or other therapeutics and will help ensure that countermeasures with limited availability such as antitoxins are prescribed appropriately and provided to individuals who will benefit from such treatments. HHS/ASPR/BARDA is supporting the development of FDA-cleared diagnostic systems for CBRN agents, pandemic influenza, and emerging infectious disease pathogens, and for the characterization of antimicrobial resistant pathogens.

**11:00 Novel Pathogen-Specific Imaging Biomarkers for Rapid, Noninvasive Whole Body Detection, Localization and Monitoring of Infections**

*Sanjay Jain, Ph.D., Associate Professor, Infectious Diseases, Johns Hopkins University School of Medicine*

Current tools to diagnose and monitor infections are dependent upon sampling suspected sites, and then performing culture or molecular techniques. This approach is invasive, often dangerous, time consuming, and is subject to incorrect sampling and contamination. Molecular imaging is a powerful, noninvasive tool that can rapidly provide three-dimensional views of disease processes deep within the body. Moreover, it has the fundamental advantage (with significant potential for clinical translation) to conduct noninvasive longitudinal assessments of the same patient.

**11:30 Sponsored Presentation (Opportunity Available)**



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12:00 pm Luncheon Presentation (*Sponsorship Opportunity Available*) or  
Enjoy Lunch on Your Own

**AGRO-DEFENSE, TOXINS & ALLERGENS**

1:55 Chairperson's Opening Remarks

*Willy Valdivia-Granda, Ph.D., CEO, Orion Integrated Biosciences*

**2:00 xMAP® Multiplex Detection: Getting beyond Detection to Include Built-In Confirmation, Characterization, and the Ability to Distinguish between Unanticipated Homologous Analytes**

*Eric Garber, Ph.D., Division of Bioanalytical Chemistry, Office of Regulatory Science, Center for Food Safety and Applied Nutrition, FDA*

By using antibody-based multiplex methods (e.g., xMAP®) it is possible to generate antigenic profiles along with other second-order forms of data processing. These results can provide built-in confirmation, recognition, and characterization of unique features, as well as the detection of novel unexpected analytes. Such approaches have been applied to the detection of toxins and recently a commercial assay was developed for the detection of food allergens to meet the complexity of a growing global marketplace and an increase in the apparent prevalence of food allergies.

**2:30 Agro-Defense - A Holistic, All of Enterprise Approach**

*Tammy R. Beckham, D.V.M., Ph.D., Dean, Professor, College of Veterinary Medicine, Kansas State University*

The ability to protect our agricultural industries, food supply, and public health sectors from natural introductions of biological agents, agro-terror threats, and emerging and re-emerging diseases is heavily dependent on an organized, strategic, and well-funded approach. This approach should institutionalize the "One Health" concept, be highly collaborative in nature, leverage all available resources and encompass an international, global health component. The One Health concept must be understood, adopted and become part of the fabric of the way in which we approach biodefense.

**SCREENING, CAPTURE & BIOSURVEILLANCE**

**3:00 Development of 11-Plex MOL-PCR Assay for the Rapid Screening of Samples for Shiga Toxin-Producing *Escherichia coli***

*Alina Deshpande, Ph.D., Group Leader, Biosecurity and Public Health, Bioscience Division, Los Alamos National Laboratory*

Shiga toxin-producing *Escherichia coli* (STEC) strains are a serious public health threat with about half of the STEC related foodborne illnesses attributable to contaminated beef. Los Alamos National Laboratory (LANL) has developed an assay that can screen samples for several important STEC-associated serogroups (O26,O45,O103, O104,O111,O121,O145,O157) and three major virulence factors (eae,stx1,stx2) in a rapid and multiplexed format using the Multiplex oligonucleotide ligation-PCR (MOL-PCR) assay chemistry. This presentation describes the development and testing of the 11-plex assay that could serve as the backbone for high-throughput screening systems for both routine screening and outbreak investigation.

**3:30 Refreshment Break in the Exhibit Hall with Poster Viewing**

**RAPID AND FUTURE TECHNOLOGIES FOR BIODETECTION**

**4:15 Broad-Based Detection and Classification of Pathogens Using Antimicrobial Peptides for Pathogen Capture**

*Chris Taitt, Ph.D., Research Biologist, United States Naval Research Laboratory*

Many current biodetectors are designed either to detect a limited number of known pathogens or to determine whether something biological is present, with little further characterization. Here, we use broad-based, semi-selective binding molecules - antimicrobial peptides - to detect a broad variety of microbes, with classification/discrimination based on binding patterns. We have recently initiated efforts to use the unique structure/function relationship of these same peptides to achieve "reagentless" sensing.

**4:45 Genomic-Based Characterization and Biosurveillance of Known and Unknown Microorganisms of Biodefense Relevance**

*Willy Valdivia-Granda, Ph.D., CEO, Orion Integrated Biosciences*

Next-generation sequencing technologies offer an unparalleled opportunity to detect and characterize microbes of public health and agrodefense concern. However, the simultaneous analysis of hundreds of genomic and metagenomic datafiles generated by different sequencing platforms remains complex. Here we present a ubiquitous approach for microbial identification that generates molecular taxonomic profiles of known and unknown microbes contextualized with geospatial attributes for attribution, bioforensics, biosurveillance and risk assessment. The implications of our system for deterrence and biodefense will be discussed.

**5:15 Welcome Reception in the Exhibit Hall with Poster Viewing**

**6:15 End of Day**

**TUESDAY, JUNE 27, 2017**

**8:00 am Morning Coffee**

**IDENTIFICATION & MANAGEMENT OF EMERGING AND RE-EMERGING PATHOGENS**

**8:25 Chairperson's Remarks**

*Donna Boston, Project Officer, U.S. Department of Health and Human Services (HHS), BARDA*

**8:30 Stability of Isolated Antibody-Antigen Complexes as a Predictive Tool for Selecting Toxin Neutralizing Antibodies**

*Patricia Legler, Ph.D., Research Biologist, U.S. Naval Research Laboratory*

Ricin is an A-B ribosome inactivating protein (RIP) toxin composed of an A-chain subunit (RTA) that contains a catalytic N-glycosidase and a B-chain (RTB) lectin domain that binds cell surface glycans. A subset of isolated antibodies (Abs) raised against the RTA subunit protect against ricin intoxication, and RTA-based vaccine immunogens have been shown to provide long-lasting protective immunity against the holotoxin. We hypothesized that neutralizing anti-RTA Abs may interfere selectively with conformational change(s) or partial unfolding required for toxin internalization.

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## TRANSLATION OF BIODETECTION TECHNOLOGIES TO FIELD READY APPLICATIONS

**9:00 Field Portable Platforms for Multiplex Detection of Biothreat Agents**  
*Neeraja Venkateswaran, Ph.D., Senior Scientist, Research and Development, Tetracore, Inc.*

This presentation will discuss the development of novel field portable systems used for detection of up to four targets per test using multiplex Lateral Flow Assays (LFA) and Real Time Polymerase Chain Reaction (RT-PCR). The visual result on LFAs is more objective and error free by using the hand held readers. These readers also keep a record and provide a numeric result for each positive or negative signal seen on LFA in under 30 seconds and were specifically designed for use by first responders.

**9:30 A Novel Host Protein-Based Assay and POC Platform for Rapidly Distinguishing Between Bacterial and Viral Infections**

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 MeMed

*Eran Eden, Ph.D., CEO and Co-Founder, MeMed*

We have developed a novel assay that integrates measurements of host proteins (TRAIL, IP-10, CRP) as an aid to differentiate bacterial from viral infection; its diagnostic performance has been demonstrated in 3 independent clinical studies (Total n = 2376). To improve utility, the assay is being mounted on a user-friendly platform that provides results within 15 minutes.

**10:00 Coffee Break in the Exhibit Hall with Poster Viewing**

**10:45 The Implications of CRISPR-Based Gene Drives for National Security**  
*Paul Enriquez, J.D., LL.M., Structural and Molecular Biochemistry Department, North Carolina State University*

Recent advances in CRISPR-based genome editing technologies have led to the development of a powerful tool to quickly reshape entire populations of wild organisms. The technique, called a gene drive, raises important legal, scientific, and ethical questions for the future of national and global biosecurity. This talk explores the key legal and regulatory issues associated with CRISPR-based gene drives. It highlights the need to address current regulatory gaps in the field, and underscores the importance of engaging members of the biodefense community in developing an adequate policy infrastructure.

## NEXT-GENERATION DEVICE COMMERCIALIZATION

**11:15 PANEL DISCUSSION: Overcoming the Barriers to Commercialization for the Next Generation in Diagnostic and Detection Devices**

*Moderator: Paul S. Eder, Ph.D., Senior Medical Diagnostics Analyst, Principal, Tunnell Government Services Contractor, Division of Diagnostics and Medical Devices (DMD), Biomedical Advanced Research and Development Authority (BARDA), Assistant Secretary for Preparedness and Response (ASPR), U.S. Department of Health and Human Services (DHHS)*

This panel discussion will examine the device development cycle from identifying the need in the marketplace to developing the technology and the strategies for implementation. In addition, our panel of experts will discuss how to navigate the FDA clearance process to insure successful device commercialization.

**12:15 pm End of Biodetection Technologies: Biothreat and Pathogen Detection Track**

### MEDIA PARTNERS



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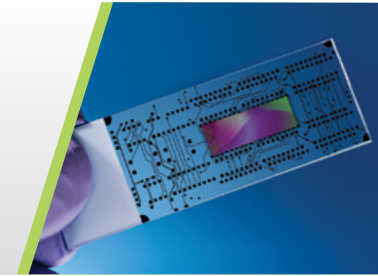
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25th International

# Biodetection Technologies:

## Point-of-Care for Biodefense



TUESDAY, JUNE 27

12:15 pm Conference Registration

### ADVANCES IN FIELDABLE TECHNOLOGIES AND ASSAYS

1:40 Chairperson's Opening Remarks

*Harshini Mukundan, Ph.D., Team Leader, Chemistry Division, Los Alamos National Laboratory*

#### 1:45 OPENING KEYNOTE PRESENTATION: Rethinking Our Approach to Fieldable Infectious Disease Diagnostics

*Charles Young, Ph.D., Chief Scientist, Applied Biology Group, Johns Hopkins University Applied Physics Lab*

Current approaches to fieldable infectious disease diagnostics are based simply on reducing the size and logistical burden of standard methods currently used in hospital laboratories. Many of the challenges faced in fielding systems to austere environments have not been addressed and some of the issues may simply prove too difficult to overcome. Perhaps it is time to reassess our current efforts and work to introduce new, novel approaches that may be more amenable for disease diagnosis under field-forward, austere conditions.

2:15 A Smart Phone Platform for Detection of Zika Virus RNA in Low Resource Settings

*Robert Meagher, Ph.D., Staff Scientist, Sandia National Laboratory*

Heightened concerns regarding the recent Zika outbreak have led to renewed calls for inexpensive, portable, and versatile diagnostic platforms. We present here a series of advances in portable nucleic acid amplification testing by interfacing our QUASR RT-LAMP assay detection with a consumer class smart phone that both controls simple assay hardware, and performs assay analysis and scoring. The resulting system breaks conventional barriers of differential diagnostics by directly detecting multiple viral targets from crude human samples, including Zika, chikungunya, and dengue viruses, and providing proof of concept for a new generation of fast, affordable, and portable diagnostic tools.

2:45 Microbiome Composition as a Universal Biosensor

*Yuriy Fofanov, Ph.D., Professor, Department of Pharmacology & Toxicology, Director of Genomics and Bioinformatics Lab, University of Texas at Galveston*

Since natural microbial communities react differently to a large spectrum of stressors, they have the potential to be used as an indicator of the unexpected (undesired) changes in the environment, such as the release of chemical/biological stressors. While tests for several dozens of chemical and biological compounds can cost hundreds of dollars and take days to perform, the latest developments in high throughput technology make the monitoring microbiome profiling a viable alternative.

3:15 Qorvo Biosensor Solution for Mobile and Point of Care Applications

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**QORVO**  
all around you

*Bryan Bothwell, MBA, Director, Strategy and Business Development, Qorvo*

Qorvo has developed a biosensor platform that creates a paradigm shift in point of care (POC) testing. By combining multi-GHz bulk acoustic wave detection arrays with microfluidics and electronics integration, the platform delivers centralized lab results at the POC, breaking the technological barrier limiting ubiquitous deployment of liquid-based biosensors across all markets. This enables the war fighter or public safety officials to take almost immediate action in the field against biological concerns and threats.

3:45 Refreshment Break in the Exhibit Hall with Poster Viewing

### OPTIMIZING PERFORMANCE OF TRADITIONAL POINT-OF-CARE DETECTION

4:15 The Application of Point-of-Care Laboratory Testing for Pathogen Detection and Patient Management in Biodefense Settings

*Kent Lewandrowski, Ph.D., Director of Clinical Laboratories, Pathology, Massachusetts General Hospital*

*Elizabeth Lewandrowski, Ph.D., Assistant in Chemistry, Co-Director, Clinical Laboratory Research Core, Massachusetts General Hospital*

Point-of-Care testing (POCT) includes technologies for pathogen detection in biodefense settings. POCT also includes a number of tests that are essential for the management of potentially infected patients. These technologies can be employed in different clinical settings including remote (or resource limited) settings, in hospital patient isolation areas and in biodefense laboratories where highly infectious agents must be contained to protect laboratory workers. This presentation will describe the various applications of POCT across the spectrum of biodefense settings.



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**4:45 Quantitative Analysis of Bacterial Growth and Rapid Antimicrobial Susceptibility Testing in an Integrated Microfluidic Platform**

*Tania Konry, Ph.D., Assistant Professor, Department of Pharmaceutical Sciences, Northeastern University*

We have developed a simple and robust microfluidic droplet-based bioassay that offers single-cell resolution for efficient monitoring of proliferation as well as morphological changes in single bacterial cells. Importantly, our developed approach allows AST under 30 min directly from urine samples without extensive pre-processing steps. Thus this approach could be a key component of fast, cost-effective, clinical AST systems for point-of-care diagnostics.

**5:15 End of Day and Workshop Registration**

**5:30 Workshop 1: Rapid Sample Preparation for Pathogen Detection\***

*Instructor: Dave Alburty, CEO, InnovaPrep LLC*  
\*Separate registration required for workshop

**WEDNESDAY, JUNE 28**

**8:00 am Morning Coffee**

**TOOLS AND TECHNOLOGIES AT THE POINT-OF-CARE**

**8:25 Chairperson's Remarks**

*Robert Meagher, Ph.D., Staff Scientist, Sandia National Laboratory*

**8:30 Rapid Point-of-Care Diagnostics for Biosurveillance**

*Harshini Mukundan, Ph.D., Team Leader, Chemistry Division, Los Alamos National Laboratory*

Innate immunity is capable of detecting all pathogens - bacteria and viruses, engineered and natural. Exploring this response, we have developed a universal strategy for diagnosis of bacterial infections. We will present our findings and the ability of our strategy to discriminate between categories of pathogens in clinical samples.

**9:00 Recent Advances in Radiation Biodosimetry for Partial and Total Body Exposures**

*Mary Sproull, Ph.D., Biologist, Radiation Oncology Branch, National Institute of Health/National Cancer Institute*

Using a murine model, we have used a proteomics approach to characterize novel biomarkers of radiation exposure and demonstrate dose response relationships. We have also developed models for dose prediction and characterized expression patterns for both total body and partial body radiation exposures. Our findings indicate that a novel combination of radiation responsive biomarker proteins is an efficient method for predicting radiation exposure and is more accurate when used in concert compared to using any single biomarker protein alone.

**9:30 An Affordable System for a Rapid Mass Casualty Response to a Large Area Coverage Biological Incident**

*Steven Hatfill, Ph.D., Adjunct Assistant Professor, Division of Clinical Research and Leadership, George Washington University School of Medicine*

Based on the proven concept of the hospital trains used for mass casualty management during the first two World Wars, the concept for an all hazards "disaster train" is outlined to illustrate a new approach to consequence management of a large-scale biological incident.

**10:00 Coffee Break in the Exhibit Hall with Poster Viewing**

**NEXT GENERATION RESOURCES FOR BIODETECTION AT THE POINT-OF-CARE**

**10:45 FEATURED PRESENTATION: BioWatch – Implementing Key Program Priorities over the Next Five Years**

*Michael Walter, Ph.D., BioWatch Program Manager, U.S. Department of Homeland Security*

This presentation will explore how the BioWatch program, housed in the Department of Homeland Security's Office of Health Affairs, is implementing its five year strategic plan, advancing four strategic priorities: 1) Upgrade the program's technology for faster, more relevant and actionable results; 2) Expand BioWatch communication to build an informed nationwide network of advocates and partners; 3) Build and strengthen operational information sharing mechanisms that provide relevant decision-making data to government officials; and 4) Expand the program's impact nationally via partnerships, coverage and technology.

**11:15 Resources for Point-of-Care Developers: Technology Watch Database**

*Joany Jackman, Ph.D., Senior Scientist, Johns Hopkins University Applied Physics Laboratory*

The Johns Hopkins Center for Point-of-Care Tests for Sexually Transmitted Diseases (STDs) has developed a website known as the Technology Watch Database. The database pulls together characteristics on hundreds of different devices for STD detection, as well as devices enabling the use of detection devices (i.e. sample preparation). Additional authors: Ron Jacak, Ph.D., Anne Rompalo, M.D., Charlotte Gaydos, Ph.D.

**11:45 Sponsored Presentation (Opportunity Available)**

**12:15 pm Luncheon Presentation (Sponsorship Opportunity Available) or Enjoy Lunch on Your Own**

**1:40 Chairperson's Remarks**

*Steven Hatfill, Ph.D., Adjunct Assistant Professor, Division of Clinical Research and Leadership, George Washington University School of Medicine*



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BIODETECTION TECHNOLOGIES: POINT-OF-CARE FOR BIODEFENSE (CONT.)

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**1:45 Development of Point of Care Diagnostic Assay for Ebola Virus Using a Immunofluorescent Strip Reader**

*Xiangguo Qiu, Ph.D., Head, Vaccine Development and Antiviral Therapy, Special Pathogens Program, National Microbiology Laboratory, Public Health Agency of Canada*

**2:15 Innovative Point-of-Need Tools**

*Roberto Spricigo, OEM Manager, Point-of-Need, QIAGEN*

The point-of-care (POC) market is overloaded with instruments that are almost equivalent in their use, yet offer a very limited test menu. The presentation will highlight the need for a new universal open platform for a broad range of rapid tests.

**2:45 The Building of an Integrated Bio Surveillance Capability - A Case Study of the Bio-Surveillance Unclassified (BSP-U)**

*Michael Ricciardi, Managing Partner, Computer Science, Relevant Technology, Inc.*

This presentation aims to describe the genesis, integration challenges and technology evolution for the pilot development BSP-U. This pilot was the first full scale decision support system that tries to address the requirements of the Bio-Surveillance mission - a "whole of government" biosurveillance capability that will facilitate collaboration, communication, and information sharing, and provide a centralization decision support to detect, manage and mitigate man-made and naturally occurring BIO events.

**3:15 Dessert Break in the Exhibit Hall with Poster Viewing**

**4:00 PANEL DISCUSSION: Impact of Diagnostic POC Technology**

*Moderator: Joany Jackman, Ph.D., Senior Scientist, Johns Hopkins University Applied Physics Laboratory*

The definition of point-of-care (POC) technology simply means that the diagnostic test can be performed at or near the patient's bedside rather than in a central laboratory. The global market for point-of-care tests is expected to reach almost \$40B (USD) by 2021 in a steady rise from \$17B in recorded sales in 2014. POCT has the ability to be "disruptive" to many aspects of health care. Potentially, POCT has the ability to change the way that patients use medical resources. Join our panel of experts to discuss the critical issues at the point-of-care and how POCT is positioned to change this landscape.

**5:00 End of Biodetection Technologies: Point-of-Care Track**

## HOTEL AND TRAVEL INFORMATION

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Rapid Detection for Food Safety

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6th International

# Biosurveillance Integration

## Integrated Management of Threats to Public Health & Safety



THURSDAY, JUNE 29

8:00 am Registration and Morning Coffee

### RISK ANTICIPATION

8:55 Chairperson's Opening Remarks

*Dave Ussery, Ph.D., Professor, University of Arkansas for Medical Sciences*

#### 9:00 OPENING KEYNOTE PRESENTATION: Biosurveillance to Protect the Homeland

*Luther Lindler, Ph.D., Senior Scientist (ST), Biological Programs, Chemical and Biological Defense Division Science and Technology Directorate, U.S. Department of Homeland Security*

One of the Department of Homeland Security's (DHS) responsibilities is to protect the U.S. from a biological attack. The Science and Technology Directorate, through the Chemical and Biological Defense Division (CBD), has developed a Real Time Threat Awareness biosurveillance program that integrates information data streams with new detection technologies. This presentation will discuss the interest areas and progress DHS CBD is making toward building a 21st century biosurveillance program.

#### 9:30 The ADEPT Program: Accelerated Defense against Emerging Dangerous Pathogens

*Gustavo Palacios, Director, Genomic Center, United States Army Research Institute of Infectious Diseases (USAMRIID)*

This presentation will examine how the ADEPT program is improving our national biopreparedness against the emerging pathogen threats.

10:00 Networking Coffee Break

#### 10:45 Climate Change, Emerging Infectious Diseases and Community Health Resilience: The Need for Early Warning

*Jeffrey Stiefel, Ph.D., Executive Coordinator, Climate Change and Health Resilience, U.S. Department of Homeland Security*

### ABERRATION DETECTION

#### 11:15 Decision Support Tools to Enhance Situational Awareness for Global Infectious Disease Surveillance

*Alina Deshpande, Ph.D., Group Leader, Biosecurity and Public Health, Bioscience Division, Los Alamos National Laboratory*

Situational awareness is important for both early warning and early detection of a disease outbreak, and analytics and tools that furnish information on how an infectious outbreak would either emerge or unfold provide enhanced situational awareness for decision makers/analysts/public health officials, and support planning for prevention or mitigation. This presentation describes a suite of tools developed at Los Alamos National Laboratory (LANL) that provide actionable information and knowledge for enhanced situational awareness during an unfolding event.

#### 11:45 The Economic and Social Impact of Emerging and Re-Emerging Infectious Disease: Mitigation through Education, Detection, Research, and Response

*David L. Hirschberg, Ph.D., Lecturer and Scientist, Department of Interdisciplinary Arts and Sciences and the Institute of Global Engagement, University of Washington, Tacoma*

12:15 pm Luncheon Presentation (Sponsorship Opportunity Available) or  
Enjoy Lunch on Your Own

### ABERRATION DETECTION (CONT.)

1:40 Chairperson's Remarks

*David L. Hirschberg, Ph.D., Lecturer and Scientist, Department of Interdisciplinary Arts and Sciences and the Institute of Global Engagement, University of Washington, Tacoma*

#### 1:45 Real Time Monitoring of RNA Viruses from Clinical Isolates

*Dave Ussery, Ph.D., Professor, University of Arkansas for Medical Sciences*

We have sequenced the genomes of several different RNA viruses from clinical isolates, using third-generation sequencing technology. The sample preparation time and experimental analysis are becoming short enough that it is possible to obtain a genome sequence from a patient within a few hours from the time of collection, at an economical cost. Phylogenomic analysis can provide rapid classification of possible geographic origins of the virus, as well as choice of which vaccine might be best to use for a current outbreak.



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**2:15 Surveillance for Foodborne Pathogens and Their Antimicrobial Resistance - Indian Case Study**

*Neelam Taneja, Professor, Medical Microbiology, PGIMER Chandigarh, India*  
Surveillance for foodborne pathogens has been neglected in India. A lot of antibiotics which are critical to human usage are being used as growth promoters. We present the data from the comprehensive surveillance we are doing in a large part of India across 5 states of India.

**THREAT IDENTIFICATION & CHARACTERIZATION**

**2:45 Alternatives to Unbiased NGS for Pathogen Identification**

*Tom Slezak, Ph.D., Distinguished Member of the Technical Staff, Global Security Program, Lawrence Livermore National Lab*

There clearly is no alternative for deep, unbiased NGS sequencing for the rare cases where a novel pathogen needs to be discovered from a complex clinical sample. But the overwhelming majority of the time pathogen identification is among the set of known (e.g., full genome sequences available) microbial organisms. We will discuss the range of options and costs available for technologies such as highly-multiplexed PCR, targeted amplification, sequence capture, and pan-microbial microarrays for laboratory and POC use.

**3:15 Networking Refreshment Break**

**INTEGRATION ANALYSIS AND SHARING**

**3:30 Epidemiology and Big Data Characterization of Multiple Co-Infections in a Clinical Setting in Rural Kenya**

*Harshini Mukundan, Ph.D., Team Leader, Chemistry Division, Los Alamos National Laboratory*

Diseases do not evolve alone. Their prevalence and dynamics are dependent on other population variables such as nutrition, distance from clinic and other pathogens that co-exist in the population. These factors cannot be recreated in a laboratory setting. Herein we present observations and critical implications derived from the study of multiple infections co-existing in one of the highest disease-burdened populations in the world- rural Siaya, Kenya.

**4:00 Biosurveillance in Resource-Limited Environments**

*Chris Taitt, Ph.D., Research Biologist, United States Naval Research Laboratory*  
We are collaborating with clinical researchers in Sierra Leone, West Africa, to test a variety of facile diagnostic platforms for infectious diseases in a resource-limited environment. Biosurveillance data generated on-site in Sierra Leone is uploaded to a cloud-based database, where they can be shared with researchers here in the US.

**4:30 Rapid Screening and Reliable Identification of Microbial Contamination in Food Samples Using Proteomics Mass Spectrometry Method**

*Rabih E. Jabbour, Ph.D., Senior Scientist, U.S. Army Edgewood Chemical Biological Center*

Every year in the U.S., there are over 48 million cases of foodborne illness. The mass spectrometry proteomics method (MSPM) does not require enrichment and is pathogen agnostic. MSPM was applied in the detection of bacteria and toxin in food samples and the results of these studies are encouraging and provide a novel venue to perform rapid analyses and accurate identification of microbes in foods samples without prior knowledge of the sample.

**5:00 End of Biosurveillance Symposium**

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11th International

# Sample Prep Technologies

## Sample Preparation for Virus, Toxin & Pathogen Detection & Identification



**TUESDAY, JUNE 27**

(Shared Afternoon Plenary Session with Biodetection Technologies:  
Point-of-Care Track)

**12:15 pm Conference Registration**

### ADVANCES IN FIELDABLE TECHNOLOGIES AND ASSAYS

**1:40 Chairperson's Opening Remarks**

*Harshini Mukundan, Ph.D., Team Leader, Chemistry Division, Los Alamos National Laboratory*

**1:45 OPENING KEYNOTE PRESENTATION: Rethinking Our Approach to Fieldable Infectious Disease Diagnostics**

*Charles Young, Ph.D., Chief Scientist, Applied Biology Group, Johns Hopkins University Applied Physics Lab*

Current approaches to fieldable infectious disease diagnostics are based simply on reducing the size and logistical burden of standard methods currently used in hospital laboratories. Many of the challenges faced in fielding systems to austere environments have not been addressed and some of the issues may simply prove too difficult to overcome. Perhaps it is time to reassess our current efforts and work to introduce new, novel approaches that may be more amenable for disease diagnosis under field-forward, austere conditions.

**2:15 A Smart Phone Platform for Detection of Zika Virus RNA in Low Resource Settings**

*Robert Meagher, Ph.D., Staff Scientist, Sandia National Laboratory*

Heightened concerns regarding the recent Zika outbreak have led to renewed calls for inexpensive, portable, and versatile diagnostic platforms. We present here a series of advances in portable nucleic acid amplification testing by interfacing our QUASR RT-LAMP assay detection with a consumer class smart phone that both controls simple assay hardware, and performs assay analysis and scoring. The resulting system breaks conventional barriers of differential diagnostics by directly detecting multiple viral targets from crude human samples, including Zika, chikungunya, and dengue viruses, and providing proof of concept for a new generation of fast, affordable, and portable diagnostic tools.

**2:45 Microbiome Composition as a Universal Biosensor**

*Yuriy Fofanov, Ph.D., Professor, Department of Pharmacology & Toxicology, Director of Genomics and Bioinformatics Lab, University of Texas at Galveston*

Since natural microbial communities react differently to large spectrum of stressors, they have potential to be used as an indicator of the unexpected (undesired) changes in the environment, such as the release of chemical/biological stressors. While tests for several dozens of chemical and biological compounds can cost hundreds of dollars and take days to perform, the latest developments in high throughput technology make the monitoring microbiome profiling a viable alternative.

**3:15 Sponsored Presentation (Opportunity Available)**

**3:45 Refreshment Break in the Exhibit Hall with Poster Viewing**

### OPTIMIZING PERFORMANCE OF TRADITIONAL POINT-OF-CARE DETECTION

**4:15 The Application of Point-of-Care Laboratory Testing for Pathogen Detection and Patient Management in Biodefense Settings**

*Kent Lewandrowski, Ph.D., Director of Clinical Laboratories, Pathology, Massachusetts General Hospital*

*Elizabeth Lewandrowski, Ph.D., Assistant in Chemistry, Co-Director, Clinical Laboratory Research Core, Massachusetts General Hospital*

Point-of-Care testing (POCT) includes technologies for pathogen detection in biodefense settings. POCT also includes a number of tests that are essential for the management of potentially infected patients. These technologies can be employed in different clinical settings including remote (or resource limited settings), in hospital patient isolation areas and in biodefense laboratories where highly infectious agents must be contained to protect laboratory workers. This presentation will describe the various applications of POCT across the spectrum of biodefense settings.

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**4:45 Quantitative Analysis of Bacterial Growth and Rapid Antimicrobial Susceptibility Testing in an Integrated Microfluidic Platform**

*Tania Konry, Ph.D., Assistant Professor, Department of Pharmaceutical Sciences, Northeastern University*

We have developed a simple and robust microfluidic droplet-based bioassay that offers single-cell resolution for efficient monitoring of proliferation as well as morphological changes in single bacterial cells. Importantly, our developed approach allows AST under 30 minutes directly from urine samples without extensive pre-processing steps. Thus this approach could be a key component of fast, cost-effective, clinical AST systems for point-of-care diagnostics.

**5:15 End of Day and Workshop Registration**

**5:30 Workshop 1: Rapid Sample Preparation for Pathogen Detection\***

*Instructor: Dave Alburty, CEO, InnovaPrep LLC*

\*Separate registration required for workshop

**WEDNESDAY, JUNE 28**

**8:00 am Morning Coffee**

**BEST PRACTICES IN BIOSPECIMEN MANAGEMENT**

**8:25 Chairperson's Remarks**

*Michael J. Heller, Professor, Departments of Bioengineering and Nanoengineering, University of California San Diego*

**8:30 OPENING KEYNOTE PRESENTATION: National Cancer Institute Resources to Improve Sample Prep**

*Helen M. Moore, Ph.D., Chief, Biorepositories and Biospecimen Research Branch, Cancer Diagnosis Program, Division of Cancer Treatment and Diagnosis, National Cancer Institute*

The National Cancer Institute sponsors biospecimen science research and develops best practices for biospecimen management, in an effort to improve the reproducibility of biospecimen-based research. This presentation will highlight several public resources available from NCI to aid researchers in various aspects of sample preparation and analysis.

**9:00 KEYNOTE PRESENTATION: Colistin Resistant Bacteria: Fantastic Beasts and Where to Find Them**

*Kurt Schaefer, Ph.D., Deputy Director, Division of Medicine, USAMRIID, U.S. Army Medical Research Institute of Infectious Diseases*

Using CDC/National Health Surveillance Network (NHSN), manufacturer recommendations, and Clinical Laboratory and Standards Institute (CLSI) guidance, we characterized *Pseudomonas* and *Enterobacteriaceae* isolates as colistin susceptible or non-susceptible. Also, we have discovered 14 other colistin resistant isolates, but not MCR-1 positive. In conclusion, surveillance for this type of resistance is significant to the overall healthcare mission and unit readiness as it directs our healthcare providers to the most effective treatments, guides industry and medical research efforts to novel valuable therapeutics, and results in enhanced standards of care.

**TARGET ENRICHMENT AND CLINICAL TEST VALIDATION**

**9:30 Seamless Sample to Answer Device for Rapid Isolation and Detection of Biomarkers**

*Michael J. Heller, Professor, Departments of Bioengineering and Nanoengineering, University of California, San Diego*

AC electrokinetic (ACE) microarray chip devices now allow sample to answer isolation and detection of cell-free (cf) DNA and exosomes (associated RNA and protein) biomarkers, as well as virus directly from blood, plasma and serum samples. Efforts are also being made to use fluorescent cf-DNA levels for cancer therapy monitoring. Newly developed on-chip immunofluorescent analysis allows rapid detection of important exosome-specific biomarkers including Glypican-1, Integrin  $\alpha$ V $\beta$ 3, CD-63 and Histone/cf-DNA nucleosomes. Overall the technology demonstrates the performance characteristics necessary for enabling rapid companion and liquid biopsy diagnostics.

**10:00 Coffee Break in the Exhibit Hall with Poster Viewing**

**10:45 PhaseGate: Nucleic Acid Extraction without Fluid Transfer**

*David Kelso, Ph.D., Clinical Professor, Biomedical Engineering, Northwestern University*

Nucleic acids (NAs) are most commonly extracted by adsorption onto silica surfaces, driven by chaotropic agents, which must then be removed, along with other contaminants, lest they interfere with PCR. PhaseGate, transports silica-coated particles magnetically between chambers that contain pre-dispersed aqueous solutions. Channels connecting the chambers, through which the magnetic particles pass, contain an immiscible liquid or gas phase, which creates an interface that prevents solutions from carrying over with the magnetic particles.

**11:15 Empowering Rapid Diagnostics with Sample Preparation Methodologies**

*Alexis Sauer-Budge, Ph.D., Senior Research Scientist, Head of Biomedical Fraunhofer CMI – Center for Manufacturing Innovation Adjunct Research, Assistant Professor, Biomedical Engineering, Boston University*

Traditionally, bacterial pathogens have been identified using culture-based methods that can take several days to obtain results. This can lead to physicians making treatment decisions based on an incomplete diagnosis. To decrease diagnosis time, we are developing novel devices and methods for isolating, concentrating, and detecting dilute viable pathogens and coupling these with novel downstream detection modalities.

**11:45 Sponsored Presentation (Opportunity Available)**

**12:15 pm Luncheon Presentation (Sponsorship Opportunity Available) or Enjoy Lunch on Your Own**

**1:40 Chairperson's Remarks**

*Alexis Sauer-Budge, Ph.D., Senior Research Scientist, Head of Biomedical Fraunhofer CMI – Center for Manufacturing Innovation Adjunct Research, Assistant Professor, Biomedical Engineering, Boston University*

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## SYSTEM ADVANCEMENTS FROM SAMPLE TO DIAGNOSIS

### 1:45 A Low-Cost, Automated, Universal Sample Preparation System

*Michael Connolly, President/CEO, Integrated Nano-Technologies, LLC*

INT has developed an efficient, universal sample preparation system with high yields of clean nucleic acids for PCR or sequencing analysis. The system has been tested against a variety of traditionally difficult clinical and environmental samples. The system concentrates nucleic acids and does not rely on dilution of the sample, resulting in high yields of nucleic acids.

### 2:15 Rapid, Evidence-Based Pathogen ID and AST Directly from Patients' Urine and Whole Blood in as Short as Two Hours

*Vincent Gau, Ph.D., President, Genefluidics, Inc.*

The vast majority of antibiotic prescriptions are made by physicians outside the hospital setting without the use of a sophisticated diagnostic device. A compact and rapid pathogen identification (ID) and antimicrobial susceptibility testing (AST) can address both the unnecessary use and overuse of antibiotics, and therefore effectively reduce antibiotic microbial resistance. We have demonstrated a molecular diagnostic platform that is capable of rapid diagnosis of common bacterial infections in as short as 30 minutes and their antibiotic resistance profile in as short as 90 minutes at hospital settings.

2:45 Presentation to be Announced

3:15 Dessert Break in the Exhibit Hall with Poster Viewing

### 4:00 PANEL DISCUSSION: Increasing the Efficiency of Collection and Concentration of Biological Particles from Air, Surfaces, and Liquids

*Moderator: Dave Alburty, CEO, InnovaPrep LLC*

Innovation in sample prep can significantly increase the sensitivity and repeatability of clinical tests. Improving the efficiency of collection and concentration of samples is critical in optimizing the analysis of the sample. This panel will examine the latest innovations in efficient sample collection and concentration. Our panel of experts will explore the improvements for biomedical and clinical applications.

5:00 End of Sample Prep Technologies Track

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Fourth Annual

# Rapid Detection for Food Safety

Advances in Genomics, Capture Technologies  
& High Throughput Detection

MONDAY, JUNE 26

(Shared Afternoon Plenary Session with Biodetection Technologies: Pathogen Detection Track)

## AGRO-DEFENSE, TOXINS & ALLERGENS

**1:55 pm Chairperson's Opening Remarks**

*Willy Valdivia-Granda, Ph.D., CEO, Orion Integrated Biosciences*

**2:00 Agro-Defense - A Holistic, All of Enterprise Approach**

*Tammy R. Beckham, D.V.M., Ph.D., Dean, Professor, College of Veterinary Medicine, Kansas State University*

The ability to protect our agricultural industries, food supply, and public health sectors from natural introductions of biological agents, agro-terror threats, and emerging and re-emerging diseases is heavily dependent on an organized, strategic, and well-funded approach. This approach should institutionalize the "One Health" concept, be highly collaborative in nature, leverage all available resources and encompass an international, global health component. The One Health concept must be understood, adopted and become part of the fabric of the way in which we approach biodefense.

**2:30 xMAP® Multiplex Detection: Getting Beyond Detection to Include Built-In Confirmation, Characterization, and the Ability to Distinguish between Unanticipated Homologous Analytes**

*Eric Garber, Ph.D., Division of Bioanalytical Chemistry, Office of Regulatory Science, Center for Food Safety and Applied Nutrition, FDA*

By using antibody-based multiplex methods (e.g., xMAP®), it is possible to generate antigenic profiles along with other second-order forms of data processing. These results can provide built-in confirmation, recognition, and characterization of unique features, as well as the detection of novel unexpected analytes. Such approaches have been applied to the detection of toxins and recently a commercial assay was developed for the detection of food allergens to meet the complexity of a growing global marketplace and an increase in the apparent prevalence of food allergies.

## SCREENING, CAPTURE & BIOSURVEILLANCE

**3:00 Development of 11-Plex MOL-PCR Assay for the Rapid Screening of Samples for Shiga Toxin-Producing *Escherichia coli***

*Alina Deshpande, Ph.D., Group Leader, Biosecurity and Public Health, Bioscience Division, Los Alamos National Laboratory*

Shiga toxin-producing *Escherichia coli* (STEC) strains are a serious public health threat with about half of the STEC related foodborne illnesses attributable to contaminated beef. Los Alamos National Laboratory (LANL) has developed an assay that can screen samples for several important STEC-associated serogroups (O26,O45,O103,O104,O111,O121,O145,O157) and three major virulence factors(eae,stx1,stx2) in a rapid and multiplexed format using the Multiplex oligonucleotide ligation-PCR (MOL-PCR) assay chemistry. This presentation describes the development and testing of the 11-plex assay that could serve as the backbone for high-throughput screening systems for both routine screening and outbreak investigation.

**3:30 Refreshment Break in the Exhibit Hall with Poster Viewing**

**4:15 Broad-Based Detection and Classification of Pathogens Using Antimicrobial Peptides for Pathogen Capture**

*Chris Taitt, Ph.D., Research Biologist, United States Naval Research Laboratory*

Many current biodetectors are designed either to detect a limited number of known pathogens or to determine whether something biological is present, with little further characterization. Here, we use broad-based, semi-selective binding molecules - antimicrobial peptides - to detect a broad variety of microbes, with classification/discrimination based on binding patterns. We have recently initiated efforts to use the unique structure/function relationship of these same peptides to achieve "reagentless" sensing.



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**4:45 Genomic-Based Characterization and Biosurveillance of Known and Unknown Microorganisms of Biodefense Relevance**

*Willy Valdivia-Granda, Ph.D., CEO, Orion Integrated Biosciences*

Next generation sequencing technologies offer an unparalleled opportunity to detect and characterize microbes of public health and agrodefense concern. However, the simultaneous analysis of hundreds of genomic and metagenomic datafiles generated by different sequencing platforms remains complex. Here we present a ubiquitous approach for microbial identification that generates molecular taxonomic profiles of known and unknown microbes contextualized with geospatial attributes for attribution, bioforensics, biosurveillance and risk assessment. The implications of our system for deterrence and biodefense will be discussed.

**5:15 Welcome Reception in the Exhibit Hall with Poster Viewing**

**6:15 End of Day**

**TUESDAY, JUNE 27**

**8:00 am Morning Coffee**

**8:55 Chairperson's Opening Remarks**

*Byron Brehm-Stecher, Ph.D., Associate Professor, Rapid Microbial Detection and Control Laboratory, Iowa State University*

**9:00 KEYNOTE PRESENTATION: Food Safety Microbiology in the Metagenomics Era**

*John Besser, Ph.D., Deputy Chief of the Enteric Diseases, Centers for Disease Control & Prevention*

Metagenomics, once the sole realm of research labs, will soon become practical for many food safety activities. Together, these advancements will change how we monitor foods and food production environments, detect and investigate outbreaks, and will fundamentally change our understanding of foodborne disease. Current sequencing-based activities for CDC's food safety programs will be described, along with a discussion of exciting possible applications in the not-too-distant future.

**9:30 FEATURED PRESENTATION: Understanding Lower Limits of Detection: Promising You Can Detect a Single Bacterial Cell in Food Samples Is One You Cannot Deliver**

*Bob Buchanan, Ph.D., Professor & Director, Center for Food Safety & Security Systems, University of Maryland*

**10:00 Coffee Break in the Exhibit Hall with Poster Viewing**

**OPTICAL & GENETIC APPROACHES FOR DETECTION & CHARACTERIZATION OF PATHOGENS**

**10:45 Rapid Detection of *Enterobacteriaceae* as Indicator for Pathogen Testing Using a Light Scattering Sensor**

*Arun Bhunia, Ph.D., Professor of Food Microbiology, Department of Food Science, Department of Comparative Pathobiology, Purdue University*

The *Enterobacteriaceae* (EB) family and its most known members, coliforms, are used as "indicators" of hygiene monitoring, sanitization practices and process verification of food products. Colony scatter images were analyzed using image classifier and results show BARDOT can potentially be used for differentiation and identification of members of EB family and the coliforms for use in food process verification, hygiene monitoring, or food safety. (Contributing authors: Marcela Martinez and Atul K. Singh)

**11:15 Genetic-Based Methods for Characterization, Detection, and Typing of *E. coli***

*Pina M. Fratamico, Ph.D., Research Microbiologist, Research Leader, Agricultural Research Service, Eastern Regional Research Center, USDA*

Developments in omic- and genetic-based technologies are enhancing the ability to detect, identify, and characterize *E. coli*. Whole genome sequencing (WGS) is providing a powerful and expanding range of information to identify targets for the development of rapid and specific detection and identification systems for *E. coli* and other bacteria and is being implemented for source tracking and as part of routine surveillance systems. It is expected that further developments in WGS and other genomic and molecular technologies will continue to contribute to the development of improved detection and identification systems and to a greater understanding of the pathogenesis of *E. coli* and ultimately provide better resources for improving public health.

**11:45 Sponsored Presentation (Opportunity Available)**

**12:15 pm Lunch on Your Own**

**METHODS OVERVIEW**

**1:40 Chairperson's Remarks**

*Arun Bhunia, Ph.D., Professor of Food Microbiology, Department of Food Science, Department of Comparative Pathobiology, Purdue University*

**1:45 Advances in Pre-Analytical Sample Preparation: Unclogging the Bottleneck from Sample to Answer**

*Byron Brehm-Stecher, Ph.D., Associate Professor, Rapid Microbial Detection and Control Laboratory, Iowa State University*

Successful detection of pathogens in foods involves the seamless integration of three interdependent steps: 1) statistically validated sampling, 2) pre-analytical sample preparation and 3) detection. Weak links in any of these three steps will propagate through the system and degrade the end result. In a worst-case scenario, this could lead to false-negative results. "Upstream" methods for sampling have long been established, and the past decade has seen a revolution in development of the hardware and reagents needed for truly rapid detection of pathogens.



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**2:05 Nucleic Acid Aptamers as Bioaffinity Ligands for Detection of Human Norovirus**

*Lee-Ann Jaykus, Ph.D., Professor, Department of Food, Bioprocessing & Nutrition Sciences, North Carolina State University*

Single-stranded DNA molecules (nucleic acid aptamers) that naturally fold into complex three-dimensional shapes with target binding affinity to various foodborne pathogens have been identified by several groups. Those with binding specificity to human norovirus, the leading cause of food-associated disease, can be used for pre-analytical sample processing, detection, infectivity determination, study of virus structure, and potential therapeutics. In this presentation, we will discuss all these possible functions in the context of norovirus aptamer candidates produced using a variety of selection approaches and evaluated for use in pristine and complex sample matrices.

**2:25 Development and Application of NGS toward Detection of Norovirus at Low Copy Number as a Single or Mixture of Viral Species Extracted from Food/Celery**

*Zhihui Yang, Ph.D., Molecular Virology Team, Division of Molecular Biology, Office of Applied Research and Safety Assessment, U.S. Food and Drug Administration*

Next generation sequencing holds promise as a single application for both detection and sequence identification of foodborne viruses. However, technical challenges remain due to anticipated low quantities or mixtures of viruses in contaminated food. In our current study, with a focus on data analysis with various bioinformatics tools, we present our approach toward the amplification-independent detection of norovirus at low copy number individually or within a mixture of two virus species/strains extracted from celery.

**2:55 Bacteriophage Engineering for the Onsite Detection of Pathogens and Indicators**

*Emma Farquharson, Ph.D. Student, Nugen Lab, Cornell University*

Bacteriophages continue to offer new tools for advancing food safety. By modifying phages to be amenable for deployable, low-cost, and rapid assays - this opens the door for significant improvements to be made to current portable methods. This allows phage-based assays to be used in resource-limited areas such as those encountered in food and agriculture.

**3:15 Nucleic Acid Biosensors for the Detection of Pathogens**

*Lingwen Zeng, Ph.D., Researcher, Institute of Environmental and Food Safety, Wuhan Academy of Agricultural Science and Technology, China*

Pathogens are recognized as widespread and toxic contaminants that can cause deleterious effects on food safety and human health. In our lab, we focus on developing nucleic acid biosensors for pathogens detection using aptamers as the molecular recognition elements. Employing colorimetric analysis, lateral flow strip biosensor, and fluorescence detector as the sensing platforms, our proposed biosensors would be promising strategies for pathogens detection which offer prominent advantages of improved sensitivity and convenience.

**3:45 Refreshment Break in the Exhibit Hall with Poster Viewing**

**4:15 Label-Free Protein Detection Based on the Heat-Transfer Method – A Case Study with the Peanut Allergen Ara h1 and Aptamer-Based Synthetic Receptors**

*Marloes Peeters, Ph.D., Assistant Professor, Chemistry & Environmental Science, Manchester Metropolitan University, United Kingdom*

Aptamers are an emerging class of molecules which, due to the development of the systematic evolution of ligands by exponential enrichment (SELEX) process, can recognize virtually every target ranging from ions, to proteins, and even whole cells. We will present the heat-transfer method (HTM) as an interesting alternative since this offers detection in a fast and low-cost manner and has the possibility of performing experiments with a fully integrated device. This concept has been demonstrated for a variety of applications including DNA mutation analysis and screening of cancer cells, but the concept of using this for food safety (allergen) detection is novel.

**4:45 New Advanced Colorimetric Assay Performed during the Enrichment Process for the Detection of Foodborne Pathogens**

*Bruce Applegate, Ph.D., Professor, Center for Food Safety Engineering, Purdue University*

Methodology for the detection of foodborne pathogens requires an enrichment step which is the time sink in most protocols. A colorimetric method which exploits this step for detection has been developed for *E. coli* O157:H7. The method also allows for the selective recovery of the pathogen if present and can be developed for other organisms as well.

**5:15 End of Rapid Detection for Food Safety Track and Workshop Registration**

**5:30 Workshop 1: Rapid Sample Preparation for Pathogen Detection\***

*Instructor: Dave Alburty, CEO, InnovaPrep LLC*

\*Separate registration required for workshop

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# Rapid Detection for Food Safety

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CAPTURE TECHNOLOGIES &  
HIGH THROUGHPUT DETECTION

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Biodefense World Summit	Biodetection Technologies: Biothreat & Pathogen Detection	Biodetection Technologies: Point-of-Care for Biodefense	Sample Prep Technologies	Biosurveillance Integration
Co-Located Event	Rapid Detection for Food Safety			

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Tuesday, June 27, 2017 | 5:45 – 8:45 pm

WS1: Rapid Sample Preparation for Pathogen Detection

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