



*Supporting Organizations:*



### **Pre- Conference Symposium Agenda\*\***

Emerging And Enabling Technologies For Chemical-Biological-Radiological-Nuclear Detection

#### **Wednesday, June 11, 2008**

7:00 – 8:00 *Continental Breakfast and Registration*

8:00– 8:30 Welcome & Introduction from the Symposium Chair  
**R. Paul Schaudies, Ph.D.**, *Chief Executive Officer, GenArraytion, Inc.*

8:30 – 9:00 **Label-free Electronic Detection of Biomolecules**  
*Many advantages accrue from replacing optical detection with electronic detection in biomolecular assays. These include less complexity, faster time to result, and palm-top portability. Quantum Logic Devices will present a nanoelectronic platform for high-throughput research and diagnostics that will accelerate efforts in genomics and proteomics and system biology and enables powerful point of care diagnostic platforms for resource-poor settings.*

**Louis Brousseau III, Ph.D.**, *CEO and President, Quantum Logic Devices*

9:00 – 9:30 **Microbial Genotyping to Definitely Characterize Biothreat Agents and Other Clinically Relevant Pathogens**  
*Biothreat agents encompass a broad range of microorganisms, including bacteria, viruses, protozoa and fungi, which infect and adversely affect the health of humans and animals. The task of identifying and characterizing this long list of agents is further complicated by intraspecies variations at the strain and biovar level that can confound standard immunoassays and PCR tests. GenArraytion, Inc. specializes in development of in-depth molecular signatures to identify essentially any biothreat agent at a level of detail that distinguishes it*

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\* Each presentation will be followed by a question and answer session

\*\* Order of presentations is subject to change.

*from its nearest neighbors. Data will be presented that illustrate the validity and robustness of this multi-locus approach for numerous biothreat organisms. Our flexible, highly multiplexed approach is compatible with numerous commercial and developing platforms and is being applied in both the biodefense and clinical arenas.*

**Doreen Robinson, Ph.D.**, Chief Operating Officer, GenArraytion, Inc.

9:30 – 10:00

**Protein and Nucleic Acid Detection Using Meso Scale Technology**

*Meso Scale Diagnostics (MSD) applies sensitive electrochemiluminescence (ECL) detection to multiplexed biological measurements by employing arrays of binding reagents that are immobilized on inexpensive screen-printed electrodes. The electrodes are used as both the solid phase for carrying out binding assays as well as the source of electrical energy for inducing ECL. For use in MSD's assay instrumentation, these electrodes are integrated into two types of assay consumables: i) proprietary multi-well plates for high throughput multiplexed measurements or ii) injection-molded microfluidic cartridges for point-of-care or field testing. The talk will present an overview of the application of MSD's technology to antibody and nucleic acid based detection of biowarfare agents.*

**George Sigal, Ph.D.**, Director of Chemistry, Meso Scale Diagnostics, LLC

10:00 – 10:30

*Morning Refreshment Break*

10:30 – 11:00

**A Nano-Technology Enabled Automated Biological Identification System**

*INT has developed an electronic DNA sensor using metal coated DNA wires. A novel micro fluidics platform has also been developed which allows for automated fluid delivery in a manufacturable disposable. Presently, INT is incorporating a universal sample preparation process using para-magnetic nano-particles to fully automate the system and increase system sensitivity.*

**Michael Connolly, Ph.D.**, President, Integrated Nano-Technologies, LLC

11:00 – 11:30

**Mass Spectrometry for the Identification of Biological Agents of Military Interest**

*Mass spectrometry-based methods are frequently used for discrimination of bacterial strains and are usually concerned with characterizing microorganisms based on biomarkers expressed by a single species or by targeting a set of signatures in case of bacterial mixtures. Therefore, novel approaches and strategies are needed for the detection and correct classification of bacteria present in complex environmental samples that may include previously unknown or bioengineered strains. Mass spectrometry-based proteomics could provide a desired sequence-based resolution, however, it usually targets a single species or a preselected set of protein/peptide markers for mixtures. Therefore, a metaproteomic approach will be presented that relies on assignments of identified experimental peptide sequences to*

*proteomes/genomes in the comprehensive protein database and creates phylogenetic profiles of peptides. These profiles may be analyzed using numerical taxonomy methods to infer taxonomic position and identity of strains composing a bacterial mixture.*

**Jacek Dworzanski, Ph.D., D.Sc.**, Senior Scientist, Science Applications International Corporation

11:30 – 12:00 **Multiplexed Biothreat Detection with Luminex xMAP Technology**

**Kerry Oliver, Ph.D.**, President & CEO, Austin BioAssays, Inc. and General Partner, Radix BioSolutions, Ltd.

12:00 – 1:30 *Group Lunch*

1:30 – 2:00 **The NRL cBASS<sup>®</sup> for Multiplexed Protein and Nucleic Acid Detection**  
*The Naval Research Laboratory's compact Bead Array Sensor System (cBASS<sup>®</sup>) is under advanced development for multiplexed detection of pathogens and toxins in environmental and clinical samples. The portable cBASS<sup>®</sup> prototype includes a suite of patented and patent-pending technologies for microfluidic, magnetic microbead-based microarray assays performed on a Bead ARray Counter (BARC<sup>®</sup>) sensor chip. There are two core aspects of the system: a semi-homogeneous Fluidic Force Discrimination<sup>™</sup> (FFD) assay, whereby biomolecular targets are captured onto microbead labels in solution, the target loaded beads are captured on a microarray surface, and nonspecifically bound bead labels are removed by controlled fluidic forces; and a detection system, whereby the number of microbead labels on each microarray element is counted. Using semi-homogeneous FFD assays, highly sensitive DNA assays (<10 fM) and immunoassays (<10 fg/ml) have been demonstrated in less than 20 min at room temperature, without amplification or concentration steps (i.e., PCR). Successful assays have also been run in serum, plasma, whole blood, and complex environmental matrices with minimal or no sample processing.*

**Shawn Mulvaney, Ph.D.**, Senior Researcher II, Surface Nanoscience & Sensor Technology Section, Naval Research Lab

2:00 – 2:30 **Pathogen Detection Using a Microflow Cytometer**

**Lisa Shriver-Lake, Ph.D.**, Research Scientist, Naval Research Laboratory

2:30 – 3:00 *Afternoon Refreshment Break*

3:00 – 3:30 **Multiplexed Detection of Biological Organisms and Toxins by Fluid Force Discrimination**  
*We describe a handheld biosensor capable of multiplexing both molecular and antigen detection immunoassays. The system uses paramagnetic beads to specifically capture the target. The beads flow over a microarray where they*

*are captured by a second antibody or capture oligonucleotide. The beads offer several advantages. They can be used to scavenge target from a relatively large volume of liquid. Because of their density, the beads settle to the surface of the microarray, rapidly transporting the antigen directly onto the capture microspots. The flow of liquid can be controlled across the surface of the chip to remove unbound beads (fluid force discrimination). The results can be read optically or by detecting the paramagnetic bead by GMR. These parameters, used together, form a rapid system for the sensitive detection of microorganisms and toxins. We have achieved limits of detection (LOD) for Francisella tularensis of  $5 \times 10^3$  CFU/ml which is at least ten fold lower than ELISA. An LOD of  $2 \times 10^4$  CFU/ml was obtained for Bacillus anthracis which is equivalent to ELISA.*

**Gary Long, Ph.D.**, *Vice President and Senior Scientist, Molecular Diagnostics, Tetracore, Inc.*

- 3:30 – 4:00    **Linear Flow Assays with Sensitive Reporters for Biomolecules**  
**Les Kirkegaard**, *Vice President of Research & Development, BioAssay Works*  
(invited)
- 4:00 – 4:15    Closing Remarks by the Symposium Chair
- R. Paul Schaudies, Ph.D.**, *Chief Executive Officer, GenArraytion, Inc.*
- 4:15            Symposium Adjourns