

## **Post-Doctoral Fellowship Opportunities at the National Biodefense Analysis and Countermeasure Center**

### **Biodefense Expertise and Site Information**

Battelle National Biodefense Institute, LLC (BNBI) manages and operates the National Biodefense Analysis and Countermeasures Center (NBACC) for the U.S. Department of Homeland Security (DHS). NBACC develops the science critical to the defense of the nation against bioterrorism. NBACC is a Federally Funded Research and Development Center (FFRDC) and is the first national laboratory built by the DHS Science & Technology directorate. The NBACC mission is to provide the nation with the scientific basis for awareness of biological threats and bioforensic analysis to support attribution of their use against the American public. NBACC is focused on developing and applying the right science to identify perpetrators of biological attacks and to help guide the nation's investments in vaccines, drugs, detectors, and other countermeasures to protect against biological terrorism.

The NBACC National Bioforensic Analysis Center (NBFAC) conducts analysis of evidence from biocrime scenes and bioterrorist attacks to attain a “biological fingerprint” to help law enforcement identify the perpetrators and determine the source, origin, and method of the attack. Designated by a Presidential Directive, NBFAC is the lead federal facility to conduct and facilitate the technical forensic analysis and interpretation of materials recovered following a biological attack, in support of the appropriate lead federal agency.

The NBACC National Biological Threat Characterization Center (NBTCC) conducts studies and laboratory experiments to better understand current and future biological threats; to assess vulnerabilities and conduct risk assessments; and to determine potential impacts to guide the development of countermeasures such as detectors, medicines, vaccines, and decontamination technologies. Biennially the NBTCC delivers to the President the *Bioterrorism Risk Assessment*—a comprehensive evaluation of the risks to the nation posed by bioterrorism.

The Coordination of Outreach, Reachback, and Evaluation (CORE) support is designated as the NBACC lead for surveillance of the rapid progress in science and technology and provides direct scientific support to DHS. CORE combines scientific learnings with NBACC knowledge for identification and evaluation of emerging trends that may alter our nation's understanding of the risk associated with a particular biothreat. Communication of the identified advancements facilitates integration of new information into existing and future strategies designed to deliver the science critical to defend the nation against bioterrorism.

For more information, visit our website: <http://www.bnbi.org>

## NBACC Project Descriptions

- **Project Title:** Molecular Characterization of Marburg Virus Quasi-Species

Project Description: The NBACC has a postdoctoral opening for a molecular virologist to perform and direct a collaborative project designed to correlate the organ specificity of Marburg virus with specific changes in the viral genome. NBACC is to determine the viral genetic sequences of RNA samples to be provided by a collaborator and provide those sequences to a bioinformatics subcontract for meta-analysis. Tasks will involve the following technical skills: primer construction and validation, RT-PCR validation, cDNA amplification, preparing cDNA for 454 pyrosequencing, generation of sequence via pyrosequencing, analysis and annotation of sequences, writing protocols, directing technical staff, and writing manuscripts and reports. This is a highly technical project which, if successful, may result in both internal reports and peer-reviewed manuscripts. The fellow will concurrently initiate planning for projects involving other viruses including literature reviews and experimental designs.

Mentor: Rick Kenyon, PhD

- **Project Title:** Characterization and Assessment of Bacterial Agents and Toxins

Project Description: The NBACC has a postdoctoral opening for a microbiologist specializing in bacterial physiology and pathogenesis. This fellow will perform an independent research project as part of a research portfolio investigating the risk of pathogenic bacteria or their toxins. While pathogenesis experience is a benefit, a working knowledge of growth characteristics, physiology, metabolism, and/or plasmid/exogenous DNA stability is strongly desired. Experiments in the portfolio will evaluate a number of correlates of bacterial growth, physiology, and markers of virulence. The fellow will actively take part in the laboratory experimentation as well as the writing of protocols, the directing of technical staff, and writing of manuscripts and reports. The fellow will also assist with the planning for other projects involving bacteria including literature reviews and experimental designs.

Mentor: Matthew Bender, PhD

- **Project Title:** Development of Synthetic Positive Mutagenized Controls for Bioforensic Real Time PCR (RT-PCR) Assays

Project Description: Develop mutagenized nucleic acid template positive controls for a range of bacterial and viral agent bioforensic Real Time PCR assays. Development will include production and evaluation of mutagenized

DNA templates for assays to detect bacterial agents including *Bacillus anthracis*, *Clostridium botulinum*, *Franciscella tularensis*, *Brucella* spp., *Burkholderia*, *Escherchia coli* O157:H7, and *Staphylococcus aureus*. Mutagenized DNA controls for Orthopoxviruses and armored RNA for Ebola, Marburg, CCHF, and Rift Valley Fever viruses will be developed as positive control templates for the detection of viral agents. The candidate will evaluate the ease of development and utility of DNA positive mutagenized controls cloned from native template as compared to DNA positive mutagenized controls developed using synthetic technologies (synthons). Limits of detection by the control templates in the Real Time PCR assays will be established by the candidate. The developed positive control templates will be used by NBFAC in bioforensic Real Time PCR assays to support biocrime and bioterror investigations.

Mentor: Jennifer Goodrich, PhD

Co-Mentors: Daniel Lackner, PhD and David Karaolis, PhD

- **Project Title:** Development, Validation, and Verification of Bioforensic Real Time PCR (RT-PCR) Assays for Enteric Bacterial Pathogens and BSL-3 and BSL-4 Viral Agents

Project Description: Develop bioforensic Real Time PCR assays to detect enteric bacterial pathogens such as *Escherchia coli* O157:H7, *Salmonella* spp. and *Shigella* spp. as well as RNA viruses including Ebola, Marburg, CCHF, and Rift Valley Fever viruses in a variety of environmental matrices. Development will include genomic sequencing, primer and probe design, assay design, and assay validation. In some instances, established clinical assays will be evaluated for use in a bioforensic context and verified for use on an ABI 7900 platform. Developed assays will be evaluated for target sensitivity and specificity within a wide range of environmental matrices. The developed assays will be used by NBFAC to support biocrime and bioterror investigations.

Mentor: Kathy Schneider, PhD

Co-Mentors: David Karaolis, PhD and Daniel Lackner, PhD

- **Project Title:** Development and Validation of Detection Bioforensic Assays for Bacterial Pathogens

Project Description: Develop conditions to facilitate bioforensic assays to detect and culture bacterial pathogens including *Bacillus anthracis*, *Francisella tularensis*, *Yersinia pestis*, *Brucella* spp., *Burkholderia* spp. and enteric pathogens such as *Escherchia coli* O157:H7, *Salmonella* spp and *Shigella* spp. Development of enrichment conditions will then be tested by bacteriological and molecular detection methods. Developed assays will be evaluated for target sensitivity and specificity within a wide range of

environmental matrices. The developed assays will be used by NBFAC to support biocrime and bioterror investigations.

Mentor: David Karaolis, PhD

- **Project Title:** Evaluation of Methods for Culture of Viruses from Environmental Samples

**Project Description:** Develop methods for the isolation and culture of viral agents from environmental samples. Development will include the evaluation of filtration, centrifugation, and use of various antibiotics in cell culture media to grow viruses from environmental samples and extracts of environmental samples. Viruses of interest include Orthopoxviruses, Alphaviruses, Arenaviruses, Bunyaviruses, Flaviviruses and their surrogates. The candidate will evaluate methods for selective cultivation of viruses in cell culture using methods that suppress natural environmental organisms that can compete and outgrow viruses in environmental samples. Limits of detection using enrichment methods will be established by the candidate. The protocol developed will be used by NBFAC in bioforensic assays to support biocrime and bioterror investigations.

Mentor: Daniel Lackner, PhD

### **NBACC Terms and Requirements for Post-doctoral Fellows**

Applicants must be U.S. citizens and be capable of obtaining security clearances. The fellowship at NBACC is contingent upon receiving the necessary security clearances. Post-doctoral fellows must provide and submit their information for the background investigation to DHS. Clearances must be obtained prior to arrival at the NBACC facility. The length of time required for the clearance screening process is highly variable. The post-doctoral fellowship start dates are flexible to accommodate this variability.

### **The Post-doctoral Experience at NBACC**

Participants in post-doctoral fellowships at NBACC work directly with NBACC scientists toward developing strategies to defend our nation against bioterrorism and biocrime. Fellows have the opportunity to learn about the skills and expertise needed to conduct biodefense research within this organization and about potential future training and career opportunities. Additionally, fellows have the ability to establish connections with researchers from a broad range of scientific and analytical fields. NBACC hosts a seminar series open to the biodefense community. NBACC is also the DHS participant in the National Interagency Confederation for Biological Research (NICBR) on the Fort Detrick campus. As such, NBACC coordinates laboratory assignments and scientific exchanges with the U.S. Army Medical Research Institute of Infectious Disease (USAMRIID), U.S. Department of Agriculture (USDA), and National Institutes of Health (NIH), including the National Cancer Institute and soon the National Institute of Allergy and Infectious Disease (NIAID). The NICBR hosts a seminar series for students, providing talks given by NCIBR campus scientists. In addition, NBACC operates as a hub, and reaches out to numerous government and academic institutions through collaborations. This creates possible collaboration opportunities for interns with scientists from numerous government and academic institutions. Depending on the specific NBACC project, interns also may attend conferences and workshops on homeland security issues, expanding their knowledge of their research project topic as well as providing them with an opportunity to network with scientific leaders.

In addition to integration with the professional community, there are numerous social opportunities for fellows. NBACC colleagues organize a monthly social outing and actively participate in community service opportunities. Social activities have included attending professional baseball games, enjoying Frederick's Friday night music fests, and hosting tailgate parties for family and friends. The Frederick community has much to offer visitors in the area (<http://www.fredericktourism.org/Index.aspx>). Frederick is about an hour drive to the Washington, DC, and Baltimore metropolitan areas, which provide additional social and cultural opportunities.

### **Contact Information**

Dr. Sadie Coberley is the NBACC point of contact for coordinating postdoctoral fellowships. She can be reached at [coperleys@nbacc.net](mailto:coperleys@nbacc.net) or 303-620-9980.