



## **Understanding Pathogenicity: A Workshop for the BWC Meeting of Experts**

### **Agenda**

- 10:00      **Welcome and Introduction**
- Overview of host-pathogen interactions  
*Kenneth Berns, University of Florida*
- Introduction to workshop focus  
*Nancy Connell, Rutgers New Jersey Medical School*
- 10:45      **Targeting pathogen virulence factors**
- Fredrik Almqvist, Umeå University*  
*Abigail Male, University of Southampton*  
*Elizabeth G. Posillico, Elusys Therapeutics, Inc.*  
*Michael Wong, Sarepta Therapeutics*
- 12:20      **Discussion of implications and relevance to the BWC forum**
- 12:45      **Lunch**
- 14:00      **Modifying host immune responses**
- Diane Williamson, Defence Science and Technology Laboratory (Dstl)*  
*Alan Cross, University of Maryland*  
*Daniel Kalman, Emory University, US (remotely)*
- 15:00      **Discussion of implications and relevance to the BWC forum**
- 15:30      **Identifying key messages and concluding remarks**
- Nancy Connell, Rutgers New Jersey Medical School*
- 16:00      **Adjourn**



## Speaker Biographies

**Fredrik Almqvist**, PhD, is Professor in the Department of Chemistry at Umeå University, Sweden and a founder of Nordic ChemQuest AB. His research involves the design, synthesis, and evaluation of novel antibacterial agents and protein aggregation inhibitors. The research programme contains a blend of computer-aided design, synthetic organic chemistry, molecular biology and genetics to investigate and disrupt complex biological systems important in disease processes. He received his PhD in organic chemistry from Lund University.

**Kenneth I. Berns**, MD, PhD, is Distinguished Professor of Molecular Genetics and Microbiology Emeritus at the University of Florida. He also serves as a member of the National Science Advisory Board for BioSecurity (NSABB). He has served as a member of the Composite Committee of the United States Medical Licensing Examination, Chairman of the Association of American Medical Colleges, President of the Association of Medical School Microbiology and Immunology Chairs, President of the American Society for Virology, President of the American Society for Microbiology and Vice-President of the International Union of Microbiological Societies. Dr. Berns' research examines the molecular basis of replication of the human parvovirus, adenoassociated virus, and the ability of an adeno-associated virus to establish latent infections and be reactivated. His work has helped provide the basis for use of this virus as a vector for gene therapy. Dr. Berns received his MD and his PhD in Biochemistry from Johns Hopkins University. He is a member of the U.S. National Academy of Sciences and the Institute of Medicine.

**Nancy Connell**, PhD, is Professor in the Division of Infectious Disease in the Department of Medicine at Rutgers New Jersey Medical School (RNJMS) and the Rutgers Biomedical Health Sciences. A Harvard University PhD in microbiology, Dr. Connell's major research focus is antibacterial drug discovery in respiratory pathogens such as *Mycobacterium tuberculosis* and *Bacillus anthracis*. She is director of the Biosafety Level 3 facility of RNJMS's Center for the Study of Emerging and Re-emerging Pathogens and chairs the university's Institutional Biosafety Committee. Dr. Connell has been continuously funded by the National Institutes of Health (NIH) and other agencies since 1993 and serves on numerous NIH study sections and review panels. She has served on a number of committees of the National Academy of Sciences, for example, the Committee on Advances in Technology and the Prevention of Their Application to Next Generation Biowarfare Agents (2004), Trends in Science and Technology Relevant to the Biological Weapons Convention; an International Workshop (2010); the Committee to Review the Scientific Approaches Used in the FBI's Investigation of the 2001 *Bacillus anthracis* Mailings (2011) and the Educational Institute for Responsible Science (Malaysia) (2013).

**Alan Cross**, MD, is Professor of Medicine at the University of Maryland School of Medicine, Associate Director for Adjuvant Biology Research and Chief, Innate Immunity and Adjuvant Section of the Center for Vaccine Development. Dr. Cross has been involved in basic and translational research, particularly the study of sepsis and vaccine development, for the past 35 years. With his colleagues at the Walter Reed Army Institute of Research, he has developed multivalent vaccines for *P. aeruginosa*, *Klebsiella* and *E. coli* that progressed to testing in human subjects. They also developed a broadly protective vaccine against Gram-negative bacteria that targets a highly conserved core endotoxin region in Gram-negative bacilli which is currently in human testing as well. Dr. Cross' laboratory also studies the role of glycosylation in the innate immune response and the potential role of small molecule inhibitors as host-oriented therapy for infectious diseases.

**Daniel Kalman**, PhD, is Associate Professor of Pathology and Laboratory Medicine at the Emory University School of Medicine. His research aims to understand how bacterial and viral pathogens interface with the host. Dr. Kalman's laboratory has focused on two aspects of this interface: (i) the immunological detection and clearance of the infection, and (ii) host systems utilized by the pathogen to facilitate infection. A long-term goal of his laboratory is to develop approaches that will permit identification of agents useful in treating disease. There is considerable impetus for this as development of resistance to antibiotic or other chemotherapies looms as perhaps the single most important public health threat confronting humans in the coming century. Dr. Kalman's current efforts have focused on the development so called "host directed therapeutics" for infections caused by *Mycobacterium tuberculosis*, filoviruses (Ebola and Marburg), orthopoxviruses, and pathogenic *E. coli*. Such drugs have lower likelihood of engendering resistance compared to conventional therapeutics. Dr. Kalman received his PhD from the University of California, Los Angeles.

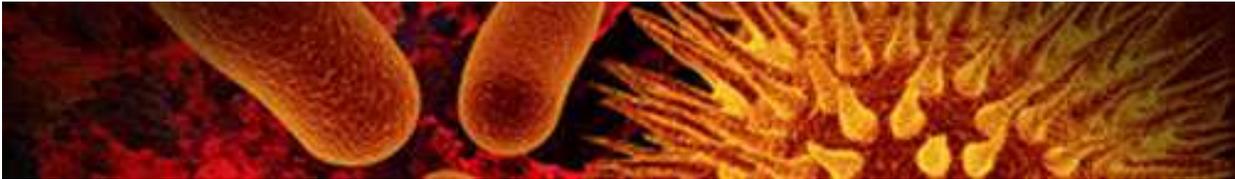
**Abigail Male**, PhD, is a Postdoctoral Researcher at the University of Southampton in the laboratory of Ali Tavassoli. The laboratory brings together an interdisciplinary team of scientists whose efforts are focused on the development of novel chemical tools that enable new insight into the role of protein-protein interactions in cell biology, and as the starting point for new therapeutics. A key area of interest for the lab is uncovering compounds that disrupt metabolite-sensing transcription factors. Dr. Male's research has included a focus on developing compounds for use in anthrax infection, by disrupting assembly of an anthrax protein complex that forms pores in host cell membranes, thereby preventing cellular entry of anthrax toxins. Dr. Male received her PhD from the University of Southampton.

**Elizabeth Posillico**, PhD, is President and CEO of Elusys Therapeutics, Inc. Dr. Posillico has 20 years of experience in the biopharmaceutical industry and has held senior positions in general management, business development, marketing and operations. She joined Elusys in 2002 as Vice President of Business Development and since then was promoted to Sr. Vice President of Operations and then President and CEO in January, 2005. Prior to joining Elusys, she was Vice President of Business Development and Marketing at Physiome Sciences, Sr. Vice President of Business Development at Apoptogen, Inc., a Canadian biotech company developing novel therapies for the treatment of apoptosis-

related diseases. She also served on the management committee of the Canadian Medical Discovery Fund, an early-stage venture capital fund. Dr. Posillico spent eight years at Genzyme Corporation in several positions including Director of Sales and Marketing for ImmunoBiological Products and ultimately as General Manager and Sr. Vice President in the Diagnostics Division. She is currently serving a two-year term as co-chair of the Alliance for BioSecurity. Dr. Posillico also serves as treasurer of the Board of Directors of BioNJ, the Biotechnology Council of New Jersey, and is on the advisory board of the Rothman Institute of Entrepreneurship, Silberman College of Business, Fairleigh Dickinson University. Dr. Posillico received a Bachelor of Arts degree from the State University of New York at Potsdam and a PhD from Duke University.

**Diane Williamson**, PhD, DSc, FRCPath, is Principal Scientist in Biomedical Sciences at the Defence Science and Technology Laboratory (DSTL) Porton Down. She is an immunologist, working in a microbiology department. She has a track record of successful research and has had scientific input to a range of R&D projects, initially in the veterinary vaccine field and more recently in the biodefence field. She has been involved with the R&D of new recombinant vaccines from initiation to clinical trial. Currently she is a Principal Scientist at DSTL Porton Down, contributing to the technical management of a number of projects towards the development of vaccines and therapies for serious human pathogens, with practical input to others. She has authored over 140 peer-reviewed papers.

**Michael Wong**, MD, is Sr. Medical Director, Infectious Disease at Sarepta Therapeutics. Sarepta Therapeutics has developed several lead agents and compounds for anti-infective agents based on its phosphorodiamidate morpholino oligomer (PMO) platform. By inhibiting pathogen replication, Sarepta aims to prevent the secondary effects of specific viral infections, or restore antibiotic susceptibility even if the target is a structural or essential gene that does not confer resistance. Antiviral agents have been developed for the filoviruses, Ebola virus and Marburg virus, and for pandemic influenza A using Sarepta's proprietary PMOplus® chemistry. Early development compounds targeting essential genes of gram negative bacteria and genes encoding for biofilm formation were also developed using the conjugation of cell penetrating proteins to the PMO.



## Discussion Questions

1. What are the most significant ways in which understanding and altering pathogen virulence mechanisms and host-pathogen interactions can contribute to improved disease treatments, defense against biological weapons, and other beneficial uses?
2. What key technical and policy barriers must be overcome to enable this field to advance effectively?
3. In what ways does research on understanding and altering pathogen virulence mechanisms and host-pathogen interactions raise potential dual-use concerns and what strategies might be useful in helping to mitigate potential concerns that arise?
4. When considering the risks and benefits of undertaking scientific investigations in this field and designing experiments, what key questions or issues do you think about?
5. What message would you most want to convey from the science community researching pathogenicity to the policy community concerned about the BWC and biosecurity issues (and in parallel, from the policy community to the scientific community).