High-Consequence Pathogens, including Potential Bioweapons, Countermeasure Development

Background

Mosquito and tick-transmitted diseases such as Zika, chikungunya, West Nile and Lyme disease are receiving a great deal of attention. The vectors that spread these diseases can rapidly infect entire regions of our nation. To control the spread of disease, it is important to monitor and take appropriate measures to control or eliminate the hazards.

Description

The Biosecurity Research Institute, or BRI, at Kansas State University's Pat Roberts Hall is one of fewer than six high containment facilities in the United States that can conduct research on livestock experimentally infected with a broad range of highly pathogenic organisms. The BRI is the designated facility at Kansas State University for work on organisms classified by the U.S. government as select agents, or SAs. SAs have the potential for weaponization and, as such, they are of high priority and require very specialized facilities and trained and approved personnel to ensure constant accountability, safety and security. The primary purpose of the research is to improve understanding and to develop diagnostics and vaccines that can better prepare the U.S. to detect and respond to foreign pathogens that threaten agriculture and public health.

This state-of-the-art facility contains an ACL/BSL-3 insectary suite available for arthropod transmission studies; a mosquito rearing room; 14 BSL-3/3Ag research laboratories, including five rooms to enable research on livestock; an ABSL-3 vivarium small animal area; and a pathogen storage room that is aBSL-3E.

The BRI is the first nonfederal facility approved to work with African swine fever, or ASF, and classical swine fever, or CSF, viruses, two highly contagious pathogens associated with high mortality in pigs. Recent acquisitions of ASFV and CSFV have enabled research that has led to testing of promising new vaccines for CSF and innovative molecular genetic studies to improve our understanding of ASF in swine. Research on Rift Valley fever virus has involved the first livestock studies to be conducted in the U.S. since the 1980s. Other SA work has been on highly pathogenic avian influenza, anthrax, glanders, plague and brucellosis.

Non-SAs studied at the BRI include Japanese encephalitis, or JEV, yellow fever and Zika virus, all of which are zoonotic pathogens carried by mosquitos that can infect humans with high morbidity and potentially high mortality. Recent mosquito experiments with JEV, a priority pathogen for study at the National Bio and Agro-defense Facility, NBAF, are the first such studies to be conducted in the U.S. since the 1940s. Our experiments with JEV demonstrated susceptibility of North American mosquitoes that could be effective vectors in the event this virus is introduced into the United States. Research with Zika virus, which has infected over 4,000 people in the U.S., investigated mosquito transmission and also supported collaborative studies to evaluate new vaccines for Zika.

With interdisciplinary biosecurity research programs, agrosecurity initiatives and the development of collaborative research, the BRI is the platform for transitioning work currently conducted at the Plum Island Animal Diseases Center to the NBAF, which is being constructed adjacent to the BRI.

Relevance

The mission of the BRI, "Leading through research and education to protect agriculture and the public from biological threats," is epitomized by its integration of interdisciplinary work on pathogens that contaminate food or infect livestock, people, and plants.

It is vitally important to develop new programs that will provide comprehensive training in both basic and applied aspects of vector biology/medical entomology, arbovirology and the epidemiology of arthropod-borne diseases. Graduate students and postdoctoral fellows to be trained will create a competent cadre of interdisciplinary professionals who will work together to anticipate and respond to arthropod-borne disease outbreaks.

Agency Contact Information

David Christian "Chris" Hassell
Deputy Assistant Secretary of Defense for Chemical and Biological Defense
Department of Defense

Homeland Security, Science & Technology
Matthew Coats
202-254-6018
matthew.coats@hq.dhs.gov

Robert B. Bertram
Chief Scientist
USAID Bureau for Food Security
rbertram@usaid.gov

Deputy Commissioner for Operations and Chief Operating Officer
Food and Drug Administration
Department of Health and Human Services