

## THE WALTER REED ARMY INSTITUTE OF RESEARCH

### *Bacterial Diseases Branch*

#### *Mission*

- To conduct basic and advanced development research by leveraging technology and information to lead a cutting-edge research program on emerging, resurgent, and/or problematic bacterial diseases
- To perform research and development activities for drugs, vaccines, and diagnostic products to target those diseases and infectious agents of especially military or national security significance. Major efforts include enteric and wound infections and other bacterial diseases

Within the WRAIR, Bacterial Disease Branch is dedicated to alleviating the military concern worldwide for bacterial pathogens such as those causing enteric infections (*Shigella* and enterotoxigenic *E. coli*) and wound infections and specific biotreats which could impact Warfighters and impair their ability to perform their missions.

The goals are to understand diseases of importance to the military; develop rapidly deployable tools for the diagnosis and detection of bacterial pathogens; evaluate the epidemiology of strains and antibiotic resistance; develop drugs and vaccines; research wound infections, multi-drug resistant organisms and their effect on wound healing; and conduct pre-clinical/clinical vaccine studies for bacterial diseases.

#### *Major Accomplishments*

- Assisted in establishing the Multi-drug Resistant Organism Surveillance Network
- Identified ten potential novel reactivators of inhibited human acetylcholinesterase (AChE) for therapeutic measures against nerve-agent exposure.
- Identified critical amino acid binding sites for reactivators on the enzyme AChE
- Clinical trials conducted for group B meningococcal vaccine

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#### *Major Accomplishments continued*

- Preclinical testing of a vaccine, prepared under Good Manufacturing Practices, against the diarrhea-causing bacteria *Shigella sonnei*
- Developed a new multiplex (Luminex) immunoassay to allow the simultaneous detection of antibodies against *Shigella* proteins
- Discovery of selective inhibitors of bacterial diguanylate cyclase as a potential means to disrupt bacterial biofilms and infection
- Supported WRAIR overseas laboratories with standardized reagents and assays
- Completed characterization of a Master Cell Bank and Production Cell Bank for WRSf2G12
- Constructed a vector for the expression of rHu linked to Fc

#### *Future Directions and Challenges:*

- Advancement of the Multi-drug Resistant Organism Surveillance Network
- Phase I trial of WRSs2 and WRSs3 at the NIAID Vaccine Trial Evaluation Unit
- Manufacture of purified *Shigella* protein and lipopolysaccharide antigens
- Development of a safer, attenuated *Brucella* vaccine
- Development of a new mouse model for intravenous challenge with *Shigella*
- Manufacture of purified *Shigella* protein and lipopolysaccharide antigens

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