



USAMRMC STRATEGIC INFORMATION PAPER WALTER REED ARMY INSTITUTE OF RESEARCH (WRAIR)

MISSION

The Walter Reed Army Institute of Research conducts biomedical research that is responsive to DoD and U.S. Army requirements and delivers lifesaving products including knowledge, technology, and medical materiel that sustain the combat effectiveness of the Warfighter.

BACKGROUND

WRAIR focuses on research to advance prevention and treatment of Soldiers for the adverse medical and operational consequences of combat stress, inadequate sleep, concussion and brain injury, infectious disease, and more.

WRAIR, which dates back to 1893, is the oldest, largest, and most diverse biomedical research laboratory in the DoD. Housed in a state-of-the-art laboratory facility and collocated with the Naval Medical Research Center, WRAIR provides unique research capabilities. For example, WRAIR maintains sleep suites; an insectary to produce vectors of militarily important diseases such as malaria, dengue fever, and leishmaniasis; biosafety level 3 laboratories; a clinical trial center for conducting human challenge studies; and a Good Manufacturing Practice-compliant bioproduction facility. WRAIR operates overseas research units in Thailand, Kenya, Germany, and the Republic of Georgia.

Special Foreign Activities of WRAIR

U.S. Army Medical Research Unit-Kenya (USAMRU-K) – USAMRU-K is a Special Foreign Activity of WRAIR. In 1969, WRAIR was invited by the Kenyan government to perform research in the Lambwe valley. The success of this effort led to the establishment of a cooperative agreement between USAMRU-K and the Kenya Medical

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Research Institute (KEMRI). The cooperative agreement allows USAMRU-K to engage in collaborative research that focuses on malaria immunology, vaccine development, drug development, vector studies, arboviral transmission, and HIV. KEMRI, the principal research component of the Kenyan Ministry of Health, has 10 centers and is headquartered in Nairobi. Other Africa activities include HIV/AIDS vaccine development and disease surveillance activities in Tanzania, Uganda, and Nigeria through an Interagency Agreement with the National Institute of Allergy and Infectious Diseases and in collaboration with the Henry M. Jackson Foundation. These sites also carry out prevention, care, and treatment of HIV/AIDS via the President's Emergency Plan for AIDS Relief and the U.S. State Department.

U.S. Army Medical Research Unit-Europe (USAMRU-E) – This unit was established in 1977 in Sembach, Germany. USAMRU-E's original mission was to conduct research examining the psychosocial influences on the causes, cure, and prevention of psychiatric battle casualties. While retaining the basic aim, over time the mission of USAMRU-E has expanded to conduct research that promotes psychological resilience and operational readiness of forward-deployed service members.

U.S. Army Medical Component of the Armed Forces Research Institute of Medical Sciences (USAMC-AFRIMS) – USAMC-AFRIMS is a Special Foreign Activity of WRAIR hosted by the Royal Thai Army and staffed by American and Thai personnel. For more than 50 years (1960), AFRIMS has been America's premier Asian site to study infectious diseases of military importance. Missions include disease surveillance, basic research, and vaccine development for enteric diseases (infectious diarrhea), malaria, tropical viral diseases, and HIV/AIDS. Satellite laboratories are located in rural Thailand (Kamphaengphet and Kanchanaburi) and Nepal. Some projects are conducted in Cambodia, Vietnam, and Bhutan with additional activities in Korea, Laos, and Indonesia.

KEY THEMES AND MESSAGES

WRAIR seeks to be the premier DoD biomedical research organization, constantly relevant, integrating basic research and advanced technology that protects, projects, and sustains the Warfighter today, invents global medical solutions for the future, and keeps the Warfighter on point for the nation.

WRAIR contains a cadre of highly skilled, exceptionally motivated, world-recognized scientists, physicians, and technical and administrative staff capable of effectively developing and incorporating cutting-edge technologies into Army research and development efforts thereby producing state-of-the-art medical solutions that address militarily relevant health issues. Despite WRAIR's focus on the military, its research has been used to solve U.S. and global nonmilitary medical problems. Its history is filled with the lifesaving or life-enhancing discoveries of distinguished scientists.



WRAIR Centers of Excellence

Center for Military Psychiatry and Neuroscience Research:

- Brain Trauma Neuroprotection and Neurorestoration
- Behavioral Biology
- Blast-Induced Neurotrauma
- Military Psychiatry
- Research Transition Office

Army Operational Medicine – Soldiers’ living and working conditions can be unlike any that civilian workers face. WRAIR is the recognized leader in operational medical research for the military in a number of fields, including sleep management, operational stress, and post-traumatic stress both during and after deployment. Key sleep research projects examine the quality and quantity of sleep needed to maintain Soldier performance, judgment, and problem-solving ability. WRAIR researchers have defined the incidence of mental health symptoms associated with deployment and reintegration into civilian life. Through Mental Health Advisory Teams conducted since the beginning of Operation Iraqi Freedom and recently in Operation Enduring Freedom, the problems faced by deployed service personnel relative to combat exposure and field operations have been defined, and access and barriers to care have been reported to service leadership. Publication and presentation of these studies have led to changes in doctrine for service training. Most importantly, Battlemind training has been developed and validated by WRAIR studies so that this valuable preventive and assessment program is available to Soldiers before, during, and after deployments through the overarching program called Comprehensive Soldier and Family Fitness (CSF2).

Combat Casualty Care – The U.S. Army strives to deliver the highest quality medical care to combat casualties on the battlefield. WRAIR scientists focus on evidence-based strategies to mitigate the effects of blast/trauma-induced brain injury that may be combined with blood loss and other traumas. Civilian firms interested in the nonmilitary applications of these technologies have become partners in many of these projects.

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Center for Infectious Disease Research:

- Bacterial Disease
- Entomology
- Military HIV Research Program
- Military Malaria Research Program
- Preventive Medicine
- Viral Disease

Infectious diseases have traditionally been the greatest threat to a Soldier's health and readiness both in the field and in garrison. In recent missions to Somalia, Haiti, Iraq, and Afghanistan, U.S. troops have confronted a wide variety of pathogenic viruses, bacteria, and parasites. Since its founding, WRAIR's primary challenge has been disease prevention based on evaluation, control, and treatment of naturally occurring infectious diseases. The Army's war on infectious diseases is conducted in the United States, at WRAIR's overseas research facilities in Kenya, Thailand, and Georgia, and wherever U.S. troops are deployed throughout the world. WRAIR is developing drugs, vaccines, diagnostic tests for use in a military environment, and other countermeasures and insect repellents to fight infectious diseases in Service Members.

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QUESTIONS & ANSWERS

Q *Who was Walter Reed?*

A Major Walter Reed was a physician, researcher, and Soldier. He remains the model of the military medical scientist. Major Reed was born in Virginia in 1851 and became the youngest graduate ever of the University of Virginia Medical School. He began his groundbreaking Army medical career serving at frontier outposts in the Arizona Territory. Major Reed later applied his knowledge of camp life, sanitation, and medicine to a prevalent problem in Army camps, typhoid fever. He proved that it was caused by the typhoid bacillus and was able to explain its route of transmission. In 1900, Major Reed was named president of a board investigating yellow fever in Cuba. The disease had killed more Soldiers than the enemy during the Spanish–American War and continued to devastate troops stationed in Cuba. Through simple yet elegant experiments, he and his team proved that the disease was spread by the *Aedes aegypti* mosquito only and was caused by a filterable virus.



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Q *What are examples of products that have been developed through WRAIR?*

A WRAIR scientists have contributed to the development of many products during the Institute's long history.

The following are recent examples of a continuing tradition.

- **Vaccines** against hepatitis A and B, influenza virus, Japanese encephalitis virus (new recombinant vaccine in 2009), meningococcal infection, and rubella (German measles).
- **Antimalarial drugs** – Most drugs used in the prevention and treatment of malaria have been created and/or tested by WRAIR researchers and laboratories.
- **Developed and validated Battlemind training** to manage combat stress, now part of Comprehensive Soldier and Family Fitness (CSF2) training.
- **Conducted clinical trials** of a *P. vivax* vaccine candidate, the first human subject challenge model to test vaccine efficacy.
- **Developed the world's only** dedicated cutaneous leishmaniasis drug development program and maintains the only certified leishmaniasis diagnostic laboratory.
- **Through our Military HIV Research Program**, first identified HIV-1 heterosexual transmission and showed efficacy of an HIV vaccine.
- **Lead agent for Mental Health Advisory Teams** to assess Service Member mental health status and behavioral care delivery system in deployed settings.
- **Identified protein markers** of traumatic brain injury (TBI) to enable the eventual production of a field-ready biomedical device capable of identifying TBI in Service Members.
- **Completed preclinical brain injury neuroprotection research** that led to the initiation of the multicenter, Phase 2 drug trial in moderate and severe TBI patients.
- **Demonstrated that** a thoracic Kevlar vest protects the brain in air shock tube exposures.
- **Established that blast exposure without secondary impact** can induce brain injury. Contributed to policy on service member evaluation following improvised explosive device blast exposure.
- **Discovered that sleep is “banked.”** Extended nighttime sleep protects against performance deficits in a subsequent week of sleep restriction.
- **Conducted the first human clinical trials** of the *P. vivax* malaria challenge.
- **RTS-S malaria** shows good efficacy in GSK Phase 3 trial in Africa (1st efficacy shown at WRAIR and portion of trial conducted at USAMRU-K).



Q *What training opportunities are provided by WRAIR?*

A WRAIR's commitment to training dates from its origins as the Army Medical School. WRAIR sponsors training programs for physicians and postdoctoral scientists and for middle to college-age students. WRAIR's three categories of training programs are as follows.

Formal, accredited training programs:

- **Preventive Medicine Residency** – Graduates of this program are equipped to practice public health in both military and civilian settings. The program emphasizes population medicine problem solving as uniquely applied to military groups.
- **Laboratory Animal Medicine Residency** – This nationally recognized 4-year program includes 2 years of didactic training at the Uniformed Services University of the Health Sciences and leads to a master's of public health degree followed by a 2-year practicum at WRAIR.
- **Clinical Pharmacology Fellowship** – A 2-year program for active duty Army physicians, Ph.D.s, and Pharm.D.s that offers focused training in the area of clinical pharmacology.

Other training programs:

- **Postdoctoral Associateships** – The Research Associateship Program of the National Research Council places postdoctoral and experienced senior scientists at WRAIR to work in one of its laboratories on research problems that both interest the scientists and fit the research priorities of WRAIR.

Community outreach programs – More information is available at www.usaeop.com:

- **Gains in the Education of Mathematics and Science (GEMS)** was designed by WRAIR scientists, under National Institutes of Health funding, and occurs every summer at WRAIR and other Army laboratories. Since, GEMS has been shown to greatly improve student attitudes toward science and all types of learning, it is now supported and funded under the U.S. Army Educational Outreach Program by the Office of the Assistant Secretary of the Army (Acquisition, Logistics, and Technology) (www.usaeop.com). Through hands-on, inquiry-based experiments taught by near-peer mentors, the program reaches out to science enthusiasts from middle and high schools that have too few science activities to maintain student interest in science, technology, engineering, and mathematics (STEM). Programs are held each summer for beginner, intermediate, and advanced participants in 1-week sessions in teaching laboratories.

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- **Science and Engineering Apprenticeship Program (SEAP):** SEAP is designed for highly qualified STEM enthusiasts to carry out research in an authentic laboratory setting with experienced scientists and engineers. The 8-week program involves the preparation of a full paper and poster presentation of the participants' work in a science meeting format at the completion of the program.
- **College Qualified Leaders Program:** Undergraduate and graduate students are able to take part in research at WRAIR throughout the year. Hundreds of students annually are able to conduct and publish research with WRAIR investigators and may also take part as near-peer mentors in the GEMS program.

Q *Are there volunteer opportunities to participate in clinical trials through WRAIR?*

A Yes. WRAIR's Clinical Trials Center (CTC) opened in 1992 to support clinical researchers at WRAIR who are developing and testing promising new vaccines and drugs for diseases of military importance. WRAIR now provides extensive support for clinical research studies conducted by the Army, Navy, National Institutes of Health, and partnered pharmaceutical companies. An average of 13–15 clinical studies are conducted each year through the CTC. To implement these studies, the department recruits more than 350 volunteers per year. Once research protocols are approved, the CTC advertises for volunteers in multiple ways, including the Internet, newspaper advertisements, posters, and fliers. If you are healthy, between the ages of 18 and 60, and wish to learn more about the clinical trials, you can contact WRAIR toll-free at 1-866-856-3259. In general, WRAIR's studies are open to participation by both military members and civilians. For more information, visit <http://www.wrairclinicaltrials.com/>.

Q *Where can I find out more information about WRAIR?*

A WRAIR has a website, which can be accessed at <http://www.wrair.army.mil/>.