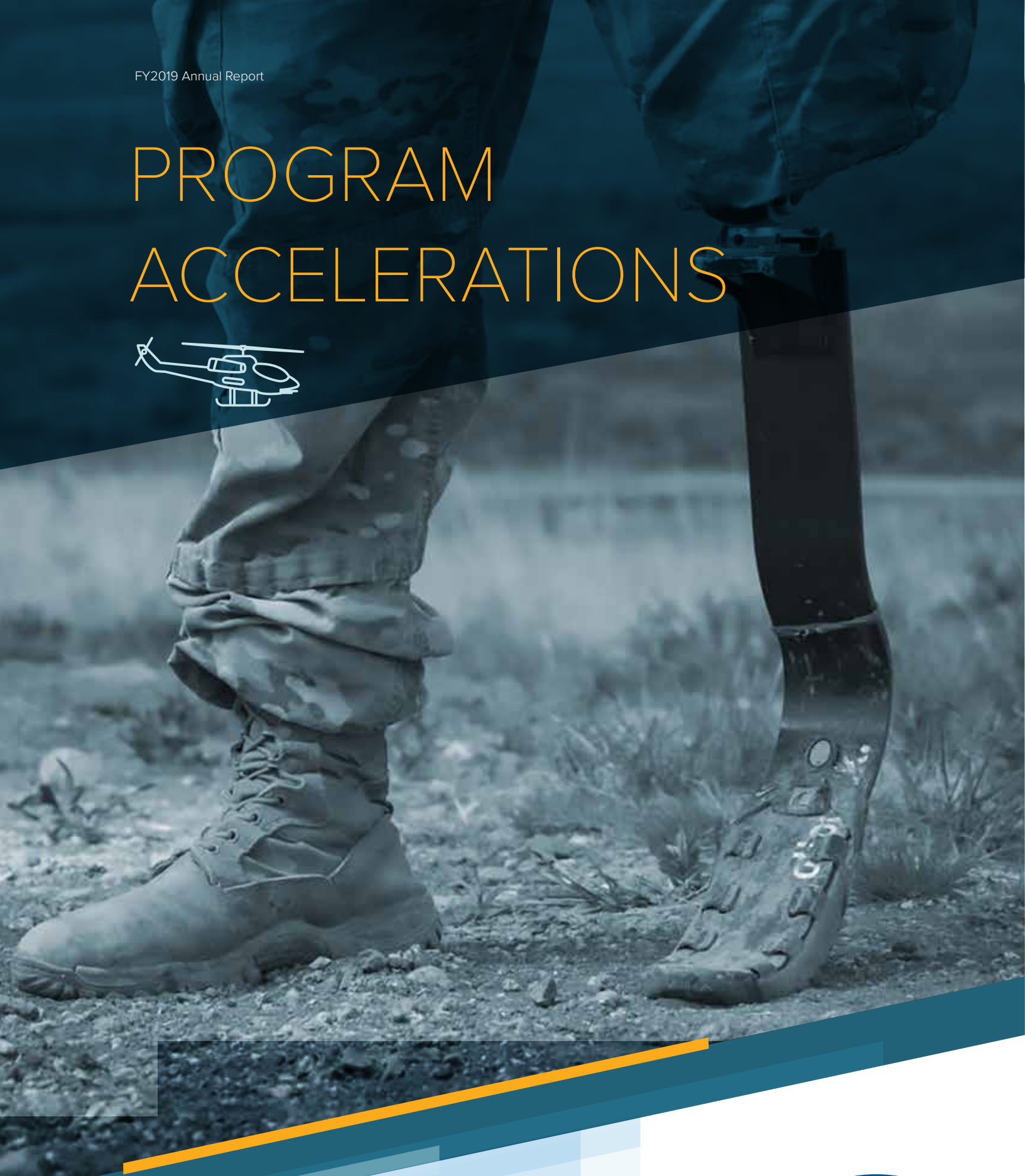
FY2019 Annual Report

PROGRAM ACCELERATIONS



USU and HJF: Partnership in 2019

Since 1983, HJF has worked with the Uniformed Services University of the Health Sciences (USU) to support research in every department from anesthesiology to surgery.

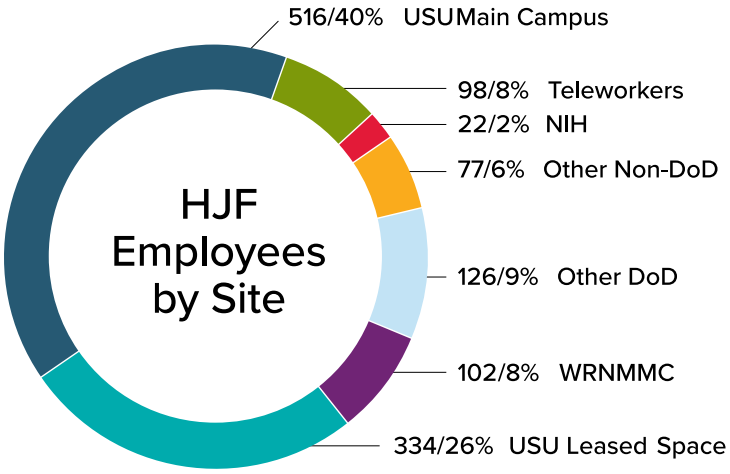
HJF is dedicated to helping physicians, nurses and medical professionals achieve success by removing barriers and empowering them to reach their goals. Wherever our employees are located and whatever their tasks, they are bound by an exceptional dedication to our critical mission and our three aims established by Congress:

Carry out medical research and education projects under cooperative agreements with the Uniformed Services University of the Health Sciences

Serve as a focus for the interchange between military and civilian medical personnel

Encourage the participation of the medical, dental, nursing, veterinary and other biomedical sciences in the work of HJF for the mutual benefit of military and civilian medicine.

HJF Employees Supporting USU (1,275 Total)



Consolidating Military Medical Research to Propel Advances

The Department of Surgery at the Uniformed Services University of the Health Sciences and the Walter Reed National Military Medical Center (USU Walter Reed Surgery) began aggregating five centers and programs in a facility that also houses HJF's Home Office in Bethesda, Maryland. The aggregation at a central location propels development of cutting-edge research and drives the development of solutions to advance critical and surgical care in public and private healthcare systems.

The centers and programs consolidated to the Leed-certified building include:

- Center for Prostate Disease Research, a comprehensive research program established in 1992 to study prostate cancer and prostate disease, moved in 2018.
- The Surgical Critical Care Initiative, develops biomarker-driven clinical decision support tools with the goal of improving clinical outcomes and reducing costs for the critically ill, moved in May 2019.
- The Murtha Cancer Center Research Program, which offers comprehensive cancer care in all disciplines of cancer treatment, moved in July 2019.
- Two additional programs will join the facilities during the second quarter of 2020:
  - The Battlefield Shock and Organ Support, which expands the capability of the larger DoD Combat Casualty Care Research Program
  - Osseointegration Programs, which is the first American osseointegration program in the field.

USU Walter Reed Surgery currently manages more than $225 million in life-cycle research funding, developing improvements in medical care with benefits to warfighters and civilian alike. Approximately 200 HJF employees are assigned to USU Walter Reed Surgery programs and these teammates support activities to advance precision medicine in surgical oncology, acute and trauma care and orthopedics.

"HJF is proud to work closely with such a dedicated group of researchers and support the commendable research into areas such as precision medicine, trauma care and much more," said HJF President and CEO Joseph Caravalho, M.D. "The close proximity to our Home Office will enable HJF to provide even greater support."

The move of all five centers and programs is expected to be completed by the end of spring 2020.

Council of Center Directors Delivers USU's Public Service Mission

In 2019, the Uniformed Services University's (USU) Council of Center Directors (CCD) completed an 18-month study to create efficiency among the school's various Centers. This resulted in a policy which structured the framework that defines a center and put in place procedures to manage efforts in various topic areas.

Established in 2017, the CCD was created to highlight the work of the USU's Centers, improve collaboration and create efficiency among this diverse group. The council was created to fulfill the requirements of the Military Health System and the broader requirements of the Department of Defense.

"The Uniformed Services University serves as the leadership academy for military health," said Air Force Colonel Todd E. Rasmussen, M.D., Chair of the Council of Center Directors. "It is also the academic hub that supports and advances military medicine and the health of U.S. forces around the globe. The USU Centers play a vital role in these missions. They are always at the ready to tackle new challenges and priorities of the DoD."

The Centers deliver USU's public service mission through various research, training and education. The fields of research covered by the Centers include:

Combat Casualty Care to include critical-care decision support tools, rehabilitation and pain management

Research and training for more effective ways to enhance warfighter performance and resilience

Improvements in diagnosing and mitigating traumatic brain injury, posttraumatic stress and the risk of suicide

Global health engagement to the development of radiation countermeasures and identification of, and treatments for, infectious diseases

Precision medicine, metabolomics, proteomics and genomic sequencing.

The Centers research, training and education efforts delivers a wide array of knowledge and material products to assist in the health and well-being of the warfighters, their families and civilians.

USU-Surgery Initiates Battlefield Shock and Organ Support Research Program

The Office of the Secretary of Defense (OSD), in its guidance to the Defense Health Program (DHP), identified the Uniformed Services University of the Health Sciences (USU) to expand its role in the next phases of combat casualty care research. To accomplish this, The Department of Surgery at USU (USU-Surgery) has initiated the Battlefield Shock and Organ Support (Battlefield SOS) research program to fill priority clinical gaps and new requirements.

The purpose of the program—a $7 million cooperative agreement to HJF with the University of Maryland as a subrecipient—is to expand the capability of the larger Department of Defense (DoD) Combat Casualty Care Research Program in response to new and emerging challenges. Battlefield SOS at USU-Surgery focuses on integrated, inter-departmental research efforts on novel approaches and technologies to stop hemorrhage, mitigate the effects of ischemia reperfusion and extend the Golden Hour of survival in future and more complex battlefield scenarios, including those in the multi-domain battlespace.

“By launching this Program, we are expanding the Combat Casualty Care presence at USU in a coordinated effort with the Defense Health Agency and the Services. The findings from our research will directly impact warfighter survival through clinical practice guidelines and the development and evaluation of novel life-saving interventions,” said Colonel Todd Rasmussen, M.D., Director, Battlefield Shock and Organ Support Research Program.

Battlefield SOS integrates various departments and disciplines at USU, Walter Reed National Military Medical Center, R Adams Cowley Shock Trauma Center in Baltimore, MD, and University of Maryland School of Medicine in Baltimore to focus on new approaches and technologies. This team is also attuned to maintenance of the military’s lethal fighting force by maintaining and reducing the Casualty Fatality Rate in future combat scenarios, including those constrained by a multi-domain battlespace.

Battlefield SOS has oversight of the DoD Combat Casualty Care Research Program (CCCRP) whose staff is currently headquartered at Fort Detrick, Maryland. Oversight by and integration with the larger DoD CCCRP is critical for the Battlefield SOS research effort to effectively identify unique areas of innovation, research and development not already being addressed by the core DHP appropriation or the individual services in this area.

The mission and overarching aim of Battlefield SOS is to test, evaluate, develop and deliver new innovative solutions that increases the survivability of, and recovery from combat wounding during the immediate and early phases after injury (i.e., Golden Hour and prolonged field care).

The objectives of this program are intended to be specific, measurable, achievable, relevant and timebound. Battlefield SOS achieves these objectives by pursuing four lines of effort to prevent death due to non-compressible torso hemorrhage, to develop new strategies to stage and definitively treat large-vessel vascular injury and shock and to prevent and mitigate the effects of ischemia reperfusion and organ failure.

The four strategic lines of effort include:

1. Exsanguination Shock and Endovascular Resuscitative Technologies: examining the mechanistic and physiological features of exsanguination shock, while testing and evaluating the next-generation endovascular resuscitation technologies such as resuscitative endovascular balloon occlusion of the aorta and the selective aortic arch perfusion.

2. Extremity Ischemia and Vascular Shunt Devices: developing, testing and evaluating technical adjuncts (e.g., a miniaturized, self-contained vascular shunt devices) or pharmacological adjuncts (e.g., valproic acid) to mitigate the effects of extremity and end-organ ischemia and to aid in the management of blood vessel trauma.

3. Biosensing Technologies: testing, evaluating and developing miniaturized biosensing technologies including skin-like wearable polymers and injectable hydrogel that enable assessment of real-time physiology.

4. Organ Failure and ExtraCorporeal Life Support (ECLS): characterizing organ dysfunction/failure (e.g., heart, lung, liver, kidney) and evaluating next-generation ECLS technologies to mitigate organ failure from battlefield injury and shock.

Battlefield SOS provides novel approaches and technologies to stop hemorrhage and mitigate the effects of ischemia reperfusion in future complex battlefield and multi-domain battlespace to help extend the Golden Hour of survival.

HIV Vaccine Trial Marks 10 Years of Progress

September 24, 2019, marked 10 years since the announcement of results from the Army-led RV144 "Thai Study," the first clinical trial to show efficacy in preventing HIV infection. The trial showed the RV144 regimen lowered the rate of HIV infection by 31.2 percent compared to placebo. HJF provided critical support to the U.S. Military HIV Research Program (MHRP) at the Walter Reed Army Institute of Research that led the study in Thailand.

These study results showed that a preventive HIV vaccine is possible, and the landmark trial continues to provide scientific direction to help guide vaccine development and testing. RV144 and its follow-on trials allowed researchers to discover correlates of risk, provided targets for optimizing vaccine boosting, and formed a foundation for the HIV vaccine candidates currently undergoing efficacy testing.

RV144
10 Years of Progress
MHRP.WRAIR

One example of the enduring impact of RV144 is a study published this year by MHRP researcher Dr. Rasmi Thomas that provides insights into HIV vaccine protection. Thomas' lab identified a transcriptional signature in B cells associated with protection from Simian Immunodeficiency Virus (SIV) or HIV infection in five independent trials of HIV vaccine candidates, including RV144, which can be used to evaluate future vaccine candidates.

In addition to its vaccine and cure research, MHRP also supported nearly 350,000 people in Africa on life-saving treatments for HIV in the last year. This program provides HIV prevention and treatment funded by the President's Emergency Plan for AIDS Relief (PEPFAR) in four African countries where MHRP conducts HIV research.

New Branch to Combat Emerging Diseases

In 2018, the Walter Reed Army Institute of Research (WRAIR) announced the creation of a new Emerging Infectious Diseases Branch (EIDB) to anticipate and counter the mounting threat of diseases of key concern to U.S. forces in the homeland and abroad.

During this past year, the program reached several milestones, including publishing the results of the first-in-man vaccine trial for Middle East respiratory syndrome coronavirus (MERS-CoV). The vaccine candidate was shown to be safe, well-tolerated, and induced a robust immune response in the trial conducted at WRAIR.

A Phase I clinical trial in Uganda was initiated by EIDB and the Makerere University-Walter Reed Project to evaluate the safety and immunogenicity of an Ebola vaccine candidate against the Sudan species of the virus in healthy adult volunteers. Though not the cause of the current DRC outbreak, it has caused multiple outbreaks in the past and is being anticipated and prepared for with the development of a safe and efficacious countermeasure.

EIDB also continued work on its Zika vaccine developed at WRAIR, through a CDMRP-funded grant, enrolled their 500th volunteer in an acute febrile illness study in West Africa, as part of the JWARG program, initiated the first observation HIV study in Jordan, and developed plans to license a vaccine to protect U.S. forces against tick-borne encephalitis.

Artificial Intelligence Models Help Detect and Diagnose Cancer

This year, HJF researchers helped develop two groundbreaking artificial intelligence (AI) models for detecting and diagnosing cancer. The models each provide further evidence of the transformative potential impact of AI on health care. “The addition of AI in a physician’s toolkit is similar to the introduction of calculators for engineers,” said James Wren, a Data Scientist on the research team.

One model demonstrates high performance in three areas—spatial resolution, grading resolution and outcome prediction—for detecting prostate cancer. Another model detects with unprecedented accuracy metastatic breast cancer that has spread to the lymph nodes. “It is truly rewarding knowing that our team is working on a device that is expected to improve the accuracy of cancer diagnoses,” said Briana Rivas, a Clinical Research Assistant and member of the slide scanning team.

An augmented reality microscope makes it possible to improve the accuracy and efficiency of cancer diagnosis. The microscope has a computer that uses AI to highlight key areas on a pathology slide, which provides doctors with expert decision support in real time.

The groundbreaking work was the result of collaboration with Naval Medical Center San Diego and Google Health. “With each additional milestone we discover other teams working on similar AI projects, solving similar problems, and as we move forward we continue to form new and exciting partnerships,” said Wren. “Navigating these partnerships allows us to move and grow in exciting ways forming the foundation with which everyone can build upon.”

Developing high-quality AI requires massive amounts of detailed and highly accurate data. Working out of Naval Medical Center San Diego, the HJF research team has spent more than two years collecting and scanning tumor biopsy slides at ultra-high resolution from thousands of cases of prostate and breast cancer. Wren developed sophisticated natural language processing software that searches pathology records to locate cancer cases. After cancer cases have been identified in the archive, Rivas and Joshua Pomorski, Research Technician, develop procedures to locate, prepare and scan the slides. The scanned images are sent to expert pathologists, who grade the cancers and score the severity.

The research team plans to continue to process other types of tissue biopsies so that we can develop more models in the future. “Next we are going to digitize many more tissue types commonly affected by cancer,” said Pomorski. “HJF researchers and machines are working day and night, while you sleep, crunching the numbers and getting closer to scientific advances in diagnosis and disease characterization.”

The Department of Laboratory Diagnostics and Monitoring Gets a Promotion

The Walter Reed Army Institute of Research is a leader in the global fight against the world's most pervasive and high impact infectious diseases. Its Department of Laboratory Diagnostics and Monitoring (DLDM) within the U.S. Military HIV Research Program plays a critical role in helping the Department of Defense in its efforts to control HIV infection and transmission within the U.S. military.

Focused on supporting clinical laboratory and clinical research programs for HIV and HIV-related infections, DLDM operates five laboratories: the HIV Diagnostics and Reference Laboratory, Leishmania Diagnostic Laboratory, Clinical Evaluation Unit, Technology Assessment Laboratory, and the Specimen Processing Laboratory and BioRepository. In addition to HIV and HIV-related infections, the labs also focus on prevalent and emerging pathogens identified as a potential threat to the U.S. military or national security interests, including Zika, Middle Eastern respiratory syndrome and Tick-borne encephalitis.

Leveraging their state-of-the-art labs, DLDM provides clinical laboratory support to U.S. military service members and their beneficiaries as well as clinical research support for the U.S. Military HIV Research Program, the Walter Reed Army Institute of Research, the Medical Research and Development Command, the U.S. Army, and the Department of Defense. DLDM has also been a significant contributor in updating HIV surveillance and case definitions for the Centers for Disease Control and Prevention.

The U.S. Army Medical Research and Development Command leaders recently elevated DLDM to the organizational level of a branch in recognition of its role as a world-class leader in the development of diagnostic countermeasures for HIV. Beginning in 2019 it will transition from the U.S. Military HIV Research Program at the Walter Reed Army Institute of Research to become the new Diagnostics and Countermeasures Branch at Fort Detrick, Maryland.

"The restructuring into a Diagnostics and Countermeasures Branch will fulfill a long standing request from the U.S. Army Medical Research and Development Command to bring in house the entire Army HIV Force Testing Services mission," said its new director, Sheila Peel, MSPH, Ph.D. "This involves performing approximately 1,200,000 HIV tests per year."

As it prepares to transition into more than 33,000 square feet of laboratory and administrative space, the new Diagnostics and Countermeasures Branch anticipates an expanded role with a brand-new set of challenges coming its way. "This is an incredible opportunity," said Janice Darden, currently Director of Operations for DLDM and soon to be the Chief of Operations for the Diagnostics and Countermeasure Branch. "We look forward to continuing to serve our warfighters and their families as well as conducting research that also has far-reaching implications for public health and disease prevention in the civilian population."

HJF Assists DPAA

Bolstered by an expansion and strengthening of partnerships, the Defense POW/MIA Accounting Agency (DPAA) in fiscal year 2019 accounted for 218 formerly missing Department of Defense (DoD) personnel from past conflicts, which is the highest yearly total reached by the agency or its predecessor organizations. Of the 218 newly accounted-for, 140 were from World War II, 73 from the Korean War and 5 from the Vietnam War.

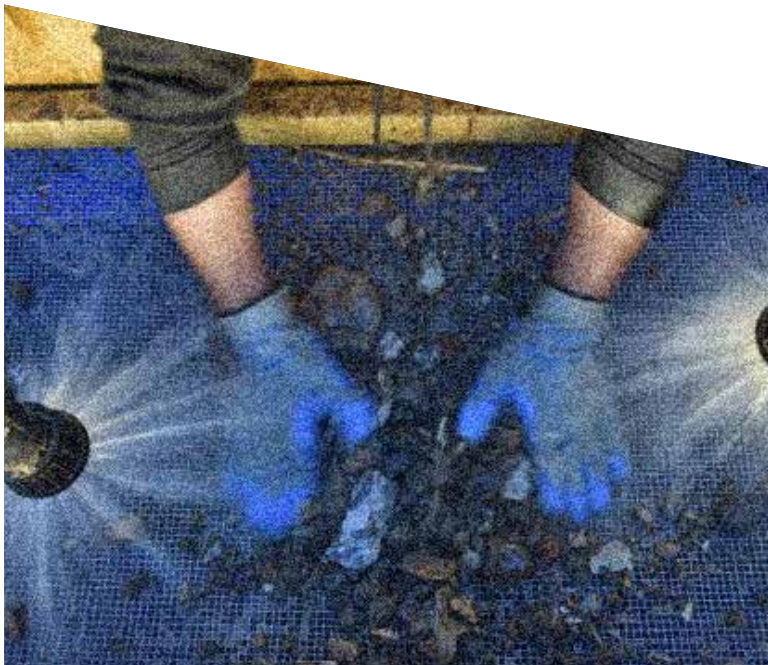
Through a cooperative agreement awarded in 2018, HJF assists DPAA in their mission by providing operational support in locating and recovering the remains of those listed as prisoners of war or missing in action.

“I love coming to work and knowing that we are doing so much to honor our fallen Soldiers, Sailors, Airmen, Marines, and Coast Guardsmen” said HJF Senior Program Manager Edie Druktenis, who is responsible for work on the cooperative agreement with DPAA. “We can never repay the debt we owe them, but it means everything to their families.”

A team of eight HJF staff is based around the world, including Germany, Joint Base Pearl Harbor-Hickam, California, Texas, and Nebraska. The roles of the team members reflect the wide range of work they perform: archaeologist, historian, program manager, database manager, and more. Their investigation and recovery work currently consists of support for a number of terrestrial and underwater missions, including water and soil testing. In addition to the work performed by the team, HJF collaborates with a wide range of partners that include universities, nonprofit organizations and others.

Currently more than 81,900 service members remain missing from past conflicts, which include World War II (72,744), the Korean War (7,606), Vietnam War (1,587), Cold War (126), and the Gulf War (5). DPAA, which is part of the DoD, is dedicated to its mission “to provide the fullest possible accounting for our missing personnel to their families and the nation.”

Looking ahead, the HJF team is already focused on supporting new missions awarded under the cooperative agreement with DPAA.



HJF Opens International Office in Kenya

In September, HJF Medical Research International, Inc. (HJFMRI) celebrated the official opening of its new office in Kisumu, Kenya. “This office symbolizes our commitment to advancing research that will improve health and save lives in Kenya, in Africa, in the United States, and across the world,” said Dr. Joseph Caravalho, Jr., HJF President and CEO, in his welcoming remarks. “It is indeed a perfect time for friends to get together and to celebrate a happy occasion.”

To mark the occasion, HJFMRI hosted a special luncheon at the newly opened office. Guests included the Honorable Anyang Nyong’o, the Governor of Kisumu County (and father of Oscar award-winning actress Lupita Nyong’o), as well as representatives from the Centers for Disease Control and Prevention (CDC), the Kenya Medical Research Institute, the U.S. Army Medical Research Directorate–Africa, and other local dignitaries.

Situated on the sloping shores of Lake Victoria, Kisumu is the third largest city (after Nairobi and Mombasa) in Kenya. The new office is located in the Milimani section of the city, which is also home to a number of non-governmental organizations based in Kenya. The office will serve as a hub for a wide variety of HJFMRI programs in collaboration with the U.S. Department of Defense, CDC and other non-governmental sponsors. By offering scientific, technical and program support to our partners, HJFMRI provides a wide range of services that facilitate basic research, scientific trials, clinical care, training, capacity-building, facility management and more.

In his remarks, Dr. Caravalho described the new office as “a milestone in HJF’s partnership with the people of Kenya.” This partnership dates back to 2001, when HJFMRI first began supporting medical research in Kenya. HJFMRI and its partners focus on a wide range of infectious disease surveillance and outbreak response to study antimicrobial resistance, malaria drug resistance, influenza, enteric pathogens, acute febrile illness, sexually transmitted infections, Rift Valley fever, vector-borne illnesses, and other infectious diseases. HJFMRI also serves in key management positions at the Kericho Clinical Research Center, which became the first laboratory in Kenya to be accredited by the College of American Pathologists. The lab also receives support from HJF and the U.S. Military HIV Research Program.

“Over the past two decades, HJFMRI has played a key role in the success of hundreds of international medical programs,” said Dr. Caravalho. “In a globalized world where infectious disease outbreaks can cross borders quickly and impart devastating effects, building partnerships is a key component to have a robust and efficient public health system. This partnership is extremely valuable to us for the good work that it is doing, and the meaningful difference it makes in the lives of so many people.”