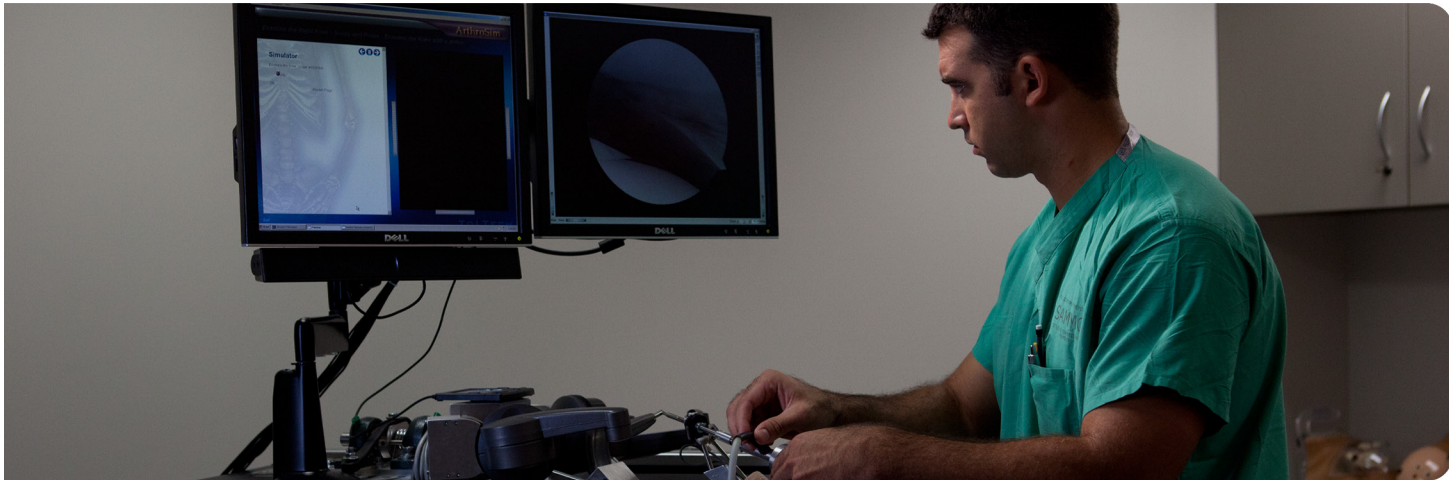


ARMY MEDICAL CORPS



ARMY ORTHOPAEDIC ADVANCEMENTS GROUNDBREAKING WORK BEING PIONEERED TODAY BY THE ARMY MEDICAL DEPARTMENT

From groundbreaking **bionic prosthetics** to **regenerative bone and tissue research**, The U.S. Army Medical Department is pioneering work that is changing the practice—and improving the success rate—of orthopaedic surgery today.

Many of these advancements are the result of years of collaboration between scientists and surgeons in the Army medical community and those at major universities and foundations around the world. Because of the Army's world-class medical resources, hundreds of studies and innovations are begun right here. It's no wonder that you'll find so many of the world's top specialists—in orthopaedics, and over 90 other specialties—are officers on the U.S. Army Health Care Team.

One of the largest health care organizations in the world, the Army Medical Department represents an annual \$9 billion investment by our nation to provide its Soldiers, veterans, and their dependents the highest quality care. It operates more than 600 world-renowned hospitals, clinics and facilities around the globe. This gives **orthopaedic surgeons** the opportunity to employ the latest technologies and practices, as well as pioneer new innovations in research and medicine.

The following are just a few of the high-profile orthopaedic technologies being developed right now in which the Army Medical Department plays a leading role.

THE NEW PROSTHETICS

THE ARMY MEDICAL DEPARTMENT HELPS
DRIVE NEW TECHNOLOGIES FROM JOYSTICK
CONTROLS TO "BIONIC FEET."

In the Pentagon's ongoing program to "revolutionize prosthetics," a wide range of state-of-the-art solutions are emerging with impressive potential.

The Defense Advanced Research Project Agency (DARPA) medical teams are working with scientists who have developed prosthetic arms controlled by foot-operated joysticks. DARPA is also conducting studies with brain implants that will directly interface with the human nervous system.

The Army has also been instrumental in helping to build the "bionic foot," a below-the-knee prosthetic that, in trials, enabled an amputee to run 8 mph on a treadmill. On another front, a joint civilian-military research project has successfully created a prosthetic knee operated by an X3 microprocessor.

The biggest news, however, has been in the development of an entire bionic lower leg system.

The PowerFoot BiOM by iWalk, unlike traditional prosthesis, actually produces energy, replaces lost muscle function and allows amputees to walk with normal metabolic rate and speed. The bionic lower leg system is

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the first clinically available prosthetic technology that is actually clinically proven to restore lost muscle function.

Funded by the Department of Veterans Affairs, Department of Defense, Telemedicine and Advanced Technology Research Center (TATRC), and developed with the help of the MIT Biomechatronics lab, the PowerFoot actually replaces the action of the foot, ankle and calf muscles that work together to propel individuals forward while walking.

THE ENERGY REPLACEMENT OFFERED BY THE POWERFOOT MAY BE ONE OF THE BIGGEST ADVANCEMENTS IN PROSTHETICS TO DATE.

Demonstrated this year at Brooke Army Medical Center's state-of-the-art orthopaedic facility, the Center for the Intrepid at Fort Sam Houston, the energy replacement offered by the PowerFoot may be one of the biggest advancements in prosthetics to date. "It is truly amazing to be part of this innovative process and finally witness products that set the new standard," says VHA National Director of Orthotics and Prosthetic Services Dr. Joseph Miller.

ADVANCEMENTS IN TRANSPLANTATION COOPERATIVE EFFORTS IN HAND TRANSPLANTATION RESEARCH ARE MAKING PROCEDURES MORE SUCCESSFUL.

In a cooperative effort between the University of Pittsburgh Medical Center, the U.S. Army Institute of Surgical Research and the Armed Forces Institute of Regenerative Medicine, a 27-year old Jersey woman became the latest patient to receive a hand transplant using the "Pittsburgh Protocol" of immune modulation.

A two-phase protocol, this involves antibody treatment followed by donor bone marrow cell therapy. In an effort to overcome the initial immune response, the procedure is then followed by a bone marrow infusion.

Fewer than a dozen hand transplant surgeries have been performed in the United States. Worldwide, 40 patients have received 50 new hands, including some double-

hand transplants. Early outcomes have confirmed that satisfactory to excellent function can be achieved with these types of procedures.

In early 2010, a team of military and civilian surgeons successfully performed a new hand transplant procedure on a retired Air Force master sergeant at San Antonio's Lackland Air Force Base.

Col. James Ficke, Chairman of the Department of Orthopaedics at Brooke Army Hospital, characterized transplantations like these as special cases involving the entire community.

Which is why the Armed Forces Institute of Regenerative Medicine (AFIRM), based at Fort Detrick, MD, plays a part in these procedures. AFIRM has helped drive many of the advancements improving outcomes for these transplants. Tasked with studying regenerative medicine therapies to treat our most severely-injured service members from around the world, AFIRM has five major research programs, including one dedicated to face and hand transplant research.

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Strategies like the Pittsburgh Protocol, studied in organ transplantation at UPMC, will help orthopaedic surgeons more successfully avoid the risks of high-dose multiple drug therapy to prevent rejection. The hope is that advancements of protocols like these will herald a new era of reconstructive transplant surgery to treat complex orthopaedic cases.

REGENERATIVE MEDICINE NEW TECHNOLOGIES MAY MAKE REGROWING LIMBS A REALITY.

The ability to "regenerate" lost skin or even limbs is closer than ever before. In fact, the work being done right now in regenerative medicine has the potential to completely reshape the orthopaedics of the future.

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The Armed Forces Institute of Regenerative Medicine (AFIRM) is leading the charge with an ambitious program that aims to help soldiers with burn and blast injuries regrow muscle, skin, tendons, nerves and even bone, said Army Col. Robert Vandre, M.D., the project's director.

"ULTIMATELY, WE WILL BE ABLE TO GROW LIMBS," VANDRE SAID. "BUT IN THE NEXT DECADE, WE SHOULD BE ABLE TO REDUCE THE NUMBER OF LIMBS THAT HAVE TO BE AMPUTATED, JUST BECAUSE WE WILL HAVE NEW WAYS TO FIX THINGS THAT CAN'T BE FIXED NOW."

"Ultimately, we will be able to grow limbs," Vandre said. "But in the next decade, we should be able to reduce the number of limbs that have to be amputated, just because we will have new ways to fix things that can't be fixed now."

AFIRM's study centers around specialized tissues and cells, such as stem cells, that are capable of renewing themselves through cell division, secreting growth factors. It's the way they interact around scaffolding created from biodegradable materials that form the foundation of the tissue to be grown, explained Vandre.

AFIRM has five major research programs: limb repair and salvage, craniofacial reconstruction, burn repair, scarless wound repair and compartment syndrome repair. By transitioning basic research to clinical trials, AFIRM hopes to accelerate the delivery of regenerative medicine therapies to the most critically injured service members.

Vandre and his colleagues believe that regenerative medicine shows the greatest promise for solving modern medicine's most challenging diseases, giving us the potential to form new bone, skin, nerves, tendons, muscles and replace damaged tissues and nerves.

WORK ON THE LEADING EDGE OF ORTHOPAEDIC SCIENCE

Orthopaedic Surgeons with the U.S. Army Reserve are applying groundbreaking technologies like these at facilities around the world. They work shoulder-to-shoulder with some of the best minds in the field, focused colleagues whose dedication to advancing care match their own.

Practicing medicine with the Army Reserve provides an environment where you can concentrate on patient care, without many of the operational concerns found in the private sector. It also provides a variety of benefits that can advance your career and enhance your lifestyle, including:

- **Competitive salary** and eligibility for several different levels of additional pay, including board-certification pay, medical additional special pay, incentive special pay and multiyear special pay
- **Health Professions Loan Repayment (HPLR)** which provides up to \$250,000 in educational loan repayment. Payments are made in yearly increments of \$40,000.
- **Paid continuing education** in your clinical specialty
- **No malpractice premiums**
- **Options to specialize** and serve at ever-increasing levels of leadership and responsibility
- **Seminars and specialty conferences** to expand your knowledge base
- **The opportunity to really put your strength in action** by participating in humanitarian missions both here in the U.S., and abroad



To receive an information packet about advancing your career with the U.S. Army Health Care Team and learn how to apply, go to healthcare.goarmy.com/info-ortho.