



PROSTHETICS/LIMB LOSS

VA researchers are exploring the use of leading-edge technology such as robotics, tissue engineering, and nanotechnology to design and build lighter, more functional prostheses that look, feel and respond more like real arms and legs. They are also exploring new methods to improve and maximize the reconstruction of injured extremities. Additionally, researchers are evaluating existing devices and studying how best to match available prosthetic components to the needs of Veterans with limb loss—especially those who seek to maintain an active lifestyle and require versatile, high-performance prostheses.

EXAMPLES OF VA RESEARCH ADVANCES

MINDING THE GAP (BETWEEN PROSTHESIS AND SKIN)—Researchers with the Center for Restorative and Regenerative Medicine, a joint project of VA, Brown University, and the Massachusetts Institute of Technology, modified the surface of titanium leg implants to promote skin cell growth, creating a natural skin layer and sealing the gap where the device would be implanted into the body. They also figured out how to bind FGF-2, a skin-growing protein, to the implant to encourage the sealing process. Implanting titanium prosthetic components avoids the need for a socket. But preventing bacterial invasion and infection is a key challenge, one that this research is promising to address.

VIRTUAL REALITY HELPS TEST BIONIC ARM—Virtual reality is an important factor in ongoing trials of “Luke,” the nickname for a high-tech prosthetic arm developed by DEKA Research and Development Corporation with funding from the Defense Advanced Research Projects Agency. Several VA medical centers are testing the arm, which has been fitted on more than two dozen volunteers. The arm can be controlled through various means, including shoe-mounted motion sensors that translate subtle foot movements into signals for the arm. Virtual reality—controlling an avatar on a computer screen—enables the user to practice controlling the arm in a simulated environment before being fitted with the device.

RISK FOR DIABETES-RELATED LIMB LOSS—Depression may increase the risk for major diabetes-related lower-limb amputations, according to results from a Seattle VA team. They used data from a national VA registry of nearly 532,000 Veterans with diabetes. Over four years of follow-up, there were 3,830 amputations. About one-third were major amputations (above the ankle); the other two-thirds were at or below the ankle. Depression increased risk by 33 percent for major amputations, but not minor ones. The group suggests further studies to determine whether depression screening and treatment in diabetics could reduce this risk.

★ **FACTS ABOUT PROSTHETICS/LIMB LOSS**—*The Department of Defense reported that more than 1,600 Service members suffered limb loss between 2001 and September 2010. Many of these men and women are now in care in the VA system, along with Veterans of previous eras who suffered limb loss. Aside from combat injuries, complications of diabetes are another major cause of amputations: In the United States, people with diabetes account for about two-thirds of all lower-limb amputations. VA has long been a world leader in prosthetics research and care, and is now in the forefront of developing and testing innovative prosthetic devices that take advantage of the latest advances in computer and robotics technology.*