

RIC Develops Bionic Arm

by John Williams

Chicago, IL - The Rehabilitation Institute of Chicago has developed a bionic arm and successfully adapted it to a woman amputee. The RIC neuro-controlled Bionic Arm allows an amputee to move his or her prosthetic arm as if it is a real limb simply by thinking. The arm empowers patients with more natural movement, greater range of motion and restores lost function.

The technology was developed by Todd Kuiken, M.D., PH.D., director of RIC's Neural Engineering Center for Bionic Medicine, and a team of leading rehabilitation experts with the support of grants from the National Institutes of Health (NIH).

To provide the neuro-controlled movement of RIC's Bionic Arm technology, nerves located in the amputee's shoulder, which once went to the amputated arm, are re-routed and connected to healthy muscle in the chest. This surgical process is called targeted muscle reinnervation. The muscle reinnervation procedure allows the re-routed nerves to grow into the chest muscle and direct the signals they once sent to the amputated arm instead to the robotic arm via surface electrodes. Then, when the patient thinks about moving his or her arm, the action is carried out voluntarily as it would be in a healthy arm allowing for smoother and easier movement of the prosthetic. In other words, the sensation nerves to the hand have been re-routed to a patch of skin on her chest. Now when the user is touched on this skin, she feels that her hand is being touched. This will eventually let her 'feel' what she is touching with an artificial hand, as if she were touching it with her own hand.

Currently available artificial arms have only up to three motors. RIC's Bionic Arm technology includes a six-motor arm developed in collaboration with researchers around the world. With a six-motor arm, patients have greater motion in the shoulder and forearm and are able to use several parts of the prosthesis simultaneously to produce the more natural arm movements. Using key findings from the first successful Bionic Arm recipient, former power lineman and double amputee from Tennessee, Jesse Sullivan, RIC made advancements in the area of sensory feedback so recipients can feel if they are touching hot or cold objects.