Neuroprosthetic Devices

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Neuro prosthetics are implantable devices designed to replace or improve the function of a certain aspect of the central nervous system. There are many different types of prosthetics for different parts of the body. There are even prosthetics for inside of the body (i.e. bladder prosthetic). The main focus of the presentation however, is on the bionic arm prosthetic.

The first ever person to be fitted with the new bionic prosthetic was Jesse Sullivan. He lost both of his arms working as a utility worker. He was originally fitted with the old prosthetic that was controlled by cables and buttons and had a hook for a hand. In 2002 he was fitted with a bionic arm. About four years later, the first woman to be fitted with the bionic arm was 26 year old Claudia Mitchell. Mitchell lost her arm in a motorcycle accident in 2004.

There are essentially two steps before one can use the prosthetic. The first step is the patient has to have surgery to take the nerve endings that once went to the arm and attach them to the pectoral muscle in the chest. After about 6 months the nerve endings will fully grow into the chest muscle. The second step is to fit the patient with the harness.

The nerve endings that are grafted to the pectoral muscle will still give off electrical impulses when the brain tells them to or when one thinks about moving their arm. The harness that was fitted to the patient has electrodes placed in it, and it wraps around the chest muscle. When the person thinks about moving their arm, the nerve endings that are now

attached to the chest muscle will cause the muscle to slightly contract. The electrodes in the harness will pick up the electrical impulse, send it to a computer chip, and the chip will translate the information into movements that the arm will make. When the patient thinks about raising their hand, twisting their wrist, bending their elbow, etc. the arm will do it. There is still work to be done on it however. Engineers hope to one day have the arm give back full sensory information such as hot, cold, texture, etc.

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