Implanted Myoelectric Control Methods for Hand Grasp

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Abstract

We have developed a second generation neuroprosthesis that is capable of stimulating twelve different muscles and recording myoelectric signals from two different muscles. The use of myoelectric control can provide significant advantages in the control of implanted upper extremity neuroprosthetic systems. First, the control source can be implanted, thus reducing the external components of the system. Second, the myoelectric recording electrode can be placed on any muscle under voluntary control, allowing the control muscle and algorithm to be customized for each user. Third, the control method can be made more natural by utilizing existing muscle activation patterns for control of grasp.

The myoelectric control methods for the first four subjects (six arms) to be implemented with this system are reviewed. All subjects utilized myoelectric signals from a forearm muscle for proportional control of grasp. The second myoelectric signal was obtained from a shoulder or neck muscle and was used to turn the system on and off, change between grasp patterns and lock or unlock the hand. The extensor carpi radialis longus, trapezius and platysma muscles have proven to be excellent candidates for control sources. We have also demonstrated that it is possible to record adequate myoelectric signals in the presence of electrical stimulation of nearby muscles.

References


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