16. A COMPARISON BETWEEN CONTROL METHODS FOR IMPLANTED FES HAND GRASP SYSTEMS

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An implanted neuroprosthesis using functional electrical stimulation (FES) was used to provide grasp and release to individuals with tetraplegia. This paper describes and compares three methods of controlling the stimulated hand grasp: shoulder position, wrist position and myoelectric activity from the wrist extensors. Three experienced neuroprosthesis users were evaluated with each of the control methods by performing a Grasp Release Test (GRT). No significant difference in overall performance was found between the three FES methods of control, but a significant improvement was found between the tenodesis and each FES method. Each method of control demonstrated advantages and disadvantages which depend upon characteristics of the individual patient. Factors which must be considered are: injury level, voluntary wrist strength, proximal upper limb strength, the level of cognition of the patient, hand grasp characteristics, cosmeses, importance of using both arms, strength of the opposite extremity, patient experience, attendant care available, trunk stability and personal preference. Due to the unique characteristics of each controller type, it is advantageous to have each type available for the FES patients to adapt the system to the needs and desires of the individual patient.