OBSERVATIONS ON AMBULATION PERFORMANCE BY PARASTEP USERS

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The Parastep system is the outcome of developments and applications of transcutaneous FES to traumatic upper-motor-unit paraplegics since 1982, with main emphasis on a patient-borne system for independent ambulation at home/work environments. The resulting system, that is presently commercially available, having received FDA approval in 1994, has been used since by more than 300 patients. The authors, who developed this system following the basic principles of earlier FES system such as by Kralj et al., will present their observations on this total patient population and specifically on the over 30 patients that went through the program at Michael Reese Hospital in Chicago.

From these observations, spanning experience of nearly 14 years of actual ambulation, the general conclusions are that (a) no adverse effect or damage were observed at all; (b) that patient-selection and patient attitude and commitment are the very major aspects influencing long-term use of FES for ambulation, and (c) that virtually all T4 to T12 paraplegics who satisfy the criteria for acceptance into the program can expect anything between 30 and 200 feet of walking at a time (with walker support), with several (mainly T7-T12 paraplegics) reaching 1 KM or more at a time. Distances reached are very difficult to predict and depend on physical constraints of the patients not necessarily determined by level of lesion or on length of training. The majority of patients with T6 lesions or higher that were observed by us can eventually take off one hand to perform simple tasks while standing and several can do so for long durations. This usually required stimulation at the paraspinals. Whereas all patients are trained in ambulation with walker support (achieving standing usually by the third session and first step by the 7th), only very few do occasionally use elbow-support crutches. Again, very few can occasionally ascent/descend a single stair.

Our present work is concerned with extending stair climbing capabilities to a few more stairs. We are investigating speech control and neural-networks-based EMB control towards these and other extensions of the Parastep’s capabilities.