**Cortical activity changes among stroke patients following robotic upper limb rehabilitation as measured by EEG during reaching movements**

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**Background and Aims**

Many stroke survivors are left with upper limb impairments that affect their ability to carry out everyday activities. Improvements in motor function are observed in many patients, however little is known about changes that occur in the brain itself. More research is required to clarify the nature, sequence, and timing of spontaneous and rehabilitation-induced neuroplastic changes that occur following stroke, and to explore how these changes relate to improvements in motor function. Electroencephalography (EEG) can be used to quantify motor cortex activity by examining event-related desynchronisation (ERD) and synchronisation (ERS) during limb movement1. The initial aim of this study was to develop a protocol to explore short-term cortical activity changes, as measured by EEG during reaching movements, in subacute stroke patients following a period of robot-assisted therapy (RT).

**Methods**

Existing literature was reviewed to identify existing methods and best practice. Design requirements were identified in accordance with the study’s research questions.

**Results**

A pilot, quasi-experimental, repeated measures design was developed, involving two groups of twelve participants each: (1) stroke patients receiving ten two-hour sessions of RT using the ArmeoSpring, over two weeks, and (2) age-matched healthy participants who will undergo the same training programme. EEG and clinical measures will be taken at different time points, to examine pre- and post- intervention trends. An adjustable reaching device was built, allowing for a standardised reaching movement and recording of movement characteristics via a potentiometer. Data collection and analysis methods will be presented.

**Conclusions**

The study will commence in the coming months. Its findings will add to the body of knowledge on neuroplasticity after stroke and will potentially assist rehabilitation professionals with selecting rehabilitation protocols that promote desired brain activity changes according to type of stroke and timing of intervention.

**References**

1. Pfurtscheller et al., 1999, Clin Neurophysiol*,* 110**,** 1842-1857.