Neurophysiological evaluation after spinal cord injury

Principle Investigator: Mary Galea

Part one
The purpose of this study is to conduct clinical and neurophysiological tests to try to more accurately determine the degree of remaining motor and sensory function and how this changes over the first 12 months after injury. This will help to identify the types of neurophysiological tests that might be useful in the future, in addition to those routinely performed in the spinal unit.

Part two
The purpose of this study is to evaluate the effect of training weak muscles in the arm or hand using EMG-triggered stimulation. Assessments conducted pre and post training aim to investigate whether this type of training improves arm/hand function, and also whether there are associated changes in the connections within the brain.

Project Aim:
The specific aims of the study are to:
1. Conduct a longitudinal investigation of sensorimotor control in people with complete and incomplete SCI over the first 12 months of injury.
2. Quantify sensorimotor changes over time and after intervention, using a range of electrophysiological methods
3. Correlate electrophysiological changes with clinical assessments of functional recovery
4. Evaluate changes in cortical excitability in subacute and chronic tetraplegic patients undertaking either standard care (including use of compensatory strategies) or EMG-triggered stimulation (ETS)-assisted exercise for selected muscles in the upper limb.

Study Questions:
The main hypotheses are that:
1. Specific patterns in electrophysiological measures will distinguish patients initially categorized as ASIA A (motor and sensory complete) who will convert to ASIA B or C.
2. Electrophysiological changes will correlate with the level of functional recovery
3. Use of the limb through ETS-assisted exercise will increase cortical excitability more profoundly than use of the limb through compensatory strategies.

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