

## Exploring the role of cortical excitability in post-stroke recovery: A neurophysiological approach from Australia

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**Statement :** Stroke remains a leading cause of long-term disability worldwide. Cortical excitability, measured via non-invasive neurophysiological techniques, has been identified as a key factor influencing motor and cognitive recovery post-stroke. This study investigates how modulations in cortical excitability correlate with rehabilitation outcomes in subacute stroke patients.

**Methodology :** A total of 50 post-stroke patients (1–6 months post-ischemic stroke) from three rehabilitation centers in Sydney were recruited. Transcranial Magnetic Stimulation (TMS) was employed to assess cortical excitability by measuring Motor Evoked Potentials (MEPs) and Short-Interval Intracortical Inhibition (SICI). Functional recovery was assessed using the Fugl-Meyer Motor Scale and Montreal Cognitive Assessment (MoCA). Patients underwent standard physiotherapy for six weeks, and excitability parameters were re-evaluated post-intervention.

**Results:** Baseline MEP amplitudes were significantly reduced in the affected hemisphere ( $p < 0.01$ ). Patients who exhibited increased cortical excitability (higher MEPs, reduced SICI) after rehabilitation showed greater improvement in motor scores (mean increase of  $18.6 \pm 4.1$  points on the Fugl-Meyer Scale,  $p < 0.001$ ). A moderate correlation ( $r = 0.56$ ) was observed between increased excitability and cognitive gains on the MoCA.

**Conclusion:** Cortical excitability serves as a valuable neurophysiological biomarker for tracking and predicting post-stroke recovery. TMS-based monitoring can provide insights into treatment responsiveness and guide individualized rehabilitation plans. These findings advocate for integrating neurophysiological tools in post-stroke care across Australian clinical settings.

### Biography

Alexandra Guedes is a clinical neurophysiologist and senior research fellow at NeuRA. She holds a PhD in Neurorehabilitation from the University of Sydney and has over a decade of experience in translational neuroscience. Her research focuses on stroke neurophysiology, neuromodulation, and brain plasticity. Dr. Guedes is an active member of the Australian Stroke Alliance and has contributed to the development of TMS protocols used in major rehabilitation hospitals. Her mission is to bring cutting-edge neurophysiological research into patient-focused rehabilitation programs in Australia and beyond.

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