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Thesis Abstract: Conventional and Topographic Electroencephalography and Somatosensory Evoked Potential Studies in Ischaemic Stroke

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Abstract of a Thesis Submitted for the Degree of Doctor Of Philosophy

The purpose of this prospective study was to assess the diagnostic and prognostic value of early electroencephalography (EEG) and somatosensory evoked potential (SEP) studies in cortical and non-cortical ischaemic stroke. Both conventional and topographic/quantitative studies were performed. A parallel study was carried out on healthy volunteers to provide an effective control. Equipment and quantitative EEG (qEEG) variability was also assessed.

Equipment was tested using an external calibration source, from which some amplitudes fell outside the ±4% specified machine limits; a customised software upgrade rectified the problem. Voltage mapping showed that a single colour change could represent a variation of 1% to 25%. Intra- and inter-operator and inter-session qEEG studies showed that most variability occurred in Absolute Power, but no significant difference was detected between 3 operators.

Fifty-one unselected acute ischaemic stroke patients were assessed clinically. All underwent non-contrast computerised tomography (CT), 16-channel EEG, 21-channel topographic qEEG, 3-channel SEP and 21-channel topographic SEP studies within 48 hours of the stroke; forty-five underwent all tests 4 to 15 days later. Final stroke classification was based on full clinical assessment, including the later CT. Clinimetric assessment included an early and 3 month Barthel Index (BI). Sixty-five healthy volunteers underwent the above electro-physiological studies after a clinical assessment; fifty-one were studied 5 to 16 days later.

Seventy-three percent of the patients were considered to have had unilateral cortical stroke and logistic regression showed that the tests most discriminating between cortical and non-cortical stroke were qEEG and CT in the first session and qEEG in the second session, at the 0.05 level. Conventional and topographic SEPs were independently associated with BI outcome in the first session, while for the second session this association applied only to conventional SEPs. Models were developed that were predictive of group (cortical/non-cortical) and outcome.

In conclusion, topographic qEEG, reflecting altered brain function after stroke, was useful in distinguishing between cortical and non-cortical ischaemic stroke, while conventional and topographic SEPs proved useful indicators of functional outcome.

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