

Early detection of early signs of ischemia in ischemic stroke by Quantitative Electric Tomography.

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Abstract

This paper focuses on the application of quantitative electric tomography (qEEG) to map changes in EEG generators for detection of early signs of ischemia in patients with acute middle cerebral artery stroke. This paper develops an EEG Tomography, integrating the high temporal resolution of electrophysiological measurements with the spatial or metabolic information provided by Magnetic resonance imaging (MRI) technique.

Thirty-two patients were studied with the diagnosis of acute ischemic stroke of the left middle cerebral artery territory, within the first 24 hours of their clinical evolution. Low-resolution electromagnetic tomography (LORETA) was used for estimating EEG source generators. High resolution source Z-spectra and 3-dimensional images of Z values for all the sources at each frequency were obtained for all cases. To estimate statistically significant increments and decrements of brain electric activity within the frequency spectra, the t-Student vs. Zero tests was performed.

A significant increment of delta activity was observed on the affected vascular territory, and a more extensive increment of theta activity was detected. A significant alpha decrement was found in the parieto-occipital region of the affected cerebral hemisphere (left), and in the medial and posterior region of the right hemisphere.

These findings suggest that qEEG Z delta images are probably related to the main ischemic core within the affected arterial territory; penumbra, diastasis, edema, might explain those observed theta and alpha abnormalities. It was concluded that qEEG is useful for the detection of early signs of ischemia in acute ischemic stroke.

Biography

Calixto Machado, MD, Ph.D. is a Full Professor and Researcher in neurology and clinical neurophysiology and currently works at the Institute of Neurology and Neurosurgery, Havana, Cuba. In 1992, he was the first Cuban neurologist who was a member of the American Academy of Neurology (AAN), nominated as a Corresponding Fellow. He is President of the Cuban Society of Clinical Neurophysiology and the President of the Organizing Committee of eight International Symposia on Brain Death and Disorders of Consciousness held in Havana since the early '90s. Dr. Machado is recognized as a world expert in brain death, coma, disorders of consciousness, neuroimaging, clinical neurophysiology, stroke, and recently on the way, SARS-CoV-2 attacks the nervous system. He was the main neurological expert in the Jahi McMath case, one of the most controversial suspected brain-dead patients, fully covered by the US and international press.