

## AT BEDSIDE

## Evidence based medicine

**Is the electroencephalogram with brain mapping superior to the traditional electroencephalogram for the diagnosis of neurological pathologies?**GIZELA KELMANN<sup>1</sup>, WANDERLEY M. BERNARDO<sup>2</sup><sup>1</sup> Resident Physician of Internal Medicine, Hospital das Clínicas de Mogi das Cruzes, Mogi das Cruzes, SP, Brazil<sup>2</sup> Coordinator of "Projeto Diretrizes" AMB-CFM; Professor of Evidence Based Medicine, UNILUS, Santos, SP, Brazil

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Knowledge about the composition of frequencies of the brain's electrical activity is a fundamental element in both research and clinical applications of the electroencephalogram (EEG). The quantitative analysis of the brain electrical activity (qEEG) uses resources from information technology when evaluating an EEG and allows for data quantification. The contribution of the quantitative perspective is important since a conventional EEG is based on the visual examination of the tracing, therefore allowing a significant subjective component. There has been great diffusion of the qEEG as an extension of the conventional EEG in the study of several clinical conditions, seeking to amplify the contribution of an analysis of the brain's electrical activity for the clinic. Different kinds of measurements can be performed with the qEEG. An analysis of the absolute and relative potency of the delta, theta, alpha (alpha 1 and alpha 2) and beta frequency bands has been widely used<sup>1</sup>.

**METHODS**

A systematic review on MEDLINE database was performed using the following search strategy: nervous system diseases AND electroencephalography AND (brain mapping OR qEEG OR quantitative) AND (diagnosis/broad [filter] OR comparative study).

The authors independently analyzed the studies by title and summary of each article retrieved and selected the articles which met the following inclusion criteria: transversal studies comparing the use of the electroencephalogram with the use of brain mapping, in Portuguese, English, or Spanish.

**RESULTS**

The literature review was finished in November of 2011. 3,263 articles were found. Nine articles were selected by their title and summary, and two articles were selected for analysis of results.

Comparative studies that were independent from the conventional or quantitative EEGs with other gold standards in the diagnosis of neurological disease were not included. Only comparisons of direct conventional EEG were included. Two studies, whose analysis of evidence are described below, were selected.

The study by Murri et al.<sup>2</sup>, which compared the conventional EEG with qEEG in the diagnosis of ischemic cerebrovascular accident (ICVA), showed that the quantitative method presents sensitivity of 100% and specificity of 60%, with likelihood ratio positive (LR+) of 2.5 and negative (LR-) of 0.

The study by Jerrett et al.<sup>3</sup> compared conventional EEG with qEEG in ICVA and cranioencephalic trauma (CET) showed a specificity of 77% and 67% respectively, and a sensitivity of 100%. The LR+ are 4 and 3, respectively, and the LR- is 0.

**EVIDENCE SYNTHESIS**

ICVA: In a population of medium prevalence (pretest probability of 72%), the use of a quantitative EEG, when positive, increases the probability for a diagnosis of ICVA in up to 92% and, when negative, dismisses the diagnosis<sup>2,3</sup>.

CET: In a population of low prevalence (pretest probability of 25%), the use of a quantitative EEG, when positive, increases the probability for a diagnosis of CET in 50% and, when negative, dismisses the diagnosis<sup>3</sup>.

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