High density EEG

Whole head, high density EEG provides up to 8x greater sampling density. 2x more spikes detected than 10-20 EEG (relative to icEEG).

In as study, Toscano et al. sought to determine whether visual analysis of high density EEG (HD-EEG) would provide similar localizing information comparable to electrical source imaging (ESI).

HD-EEG (256 electrodes) recordings from 20 patients suffering from unifocal, drug-resistant epilepsy (13 women, mean age 29.1 ± 2.62 years, 11 with temporal lobe epilepsy) were examined. In the visual analysis condition, we identified the 5 contacts with maximal spike amplitude and determined their localization with respect to the underlying cortex. ESI was computed using the LAURA algorithm of the averaged spikes in the patient's individual MRI. We considered the localization “correct” if all 5 contacts were concordant with the resection volume underneath or if ESI was located within the resection as determined by the postoperative MRI.

Twelve patients were postoperatively seizure-free (Engel Class IA), while the remaining eight were in class IB to IV. Visual analysis and ESI showed sensitivity of 58% and 75%, specificity of 75% and 87%, and accuracy of 65% and 80%, respectively. In 70% of cases, visual analysis and ESI provided concordant results. Conclusions:

Localization of the electrodes with maximal spike amplitude provides very good estimation of the localization of the underlying source. However, ESI has a higher accuracy and adds 3D information; therefore, it should remain the tool of choice for presurgical evaluation.

The present study proposes the possibility to analyze HD-EEG visually, in tandem with ESI or alone, if ESI is not accessible [1)].

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