Automated EEG source imaging

Baroumand et al. from Medical Image and Signal Processing Group, Department of Electronics and Information Systems, Ghent, Belgium, Aarhus, Copenhagen, Dianalund, Hvidovre, Denmark, evaluated the accuracy of automated EEG source imaging (ESI) in localizing epileptogenic zone.

Long-term EEG, recorded with the standard 25-electrode array of the IFCN, from 41 consecutive patients with focal epilepsy who underwent resective surgery, were analyzed blinded to the surgical outcome. The automated analysis comprised spike-detection, clustering and source imaging at the half-rising time and at the peak of each spike-cluster, using individual head-models with six tissue-layers and a distributed source model (sLORETA). The fully automated approach presented ESI of the cluster with the highest number of spikes, at the half-rising time. In addition, a physician involved in the presurgical evaluation of the patients, evaluated the automated ESI results (up to four clusters per patient) in clinical context and selected the dominant cluster and the analysis time-point (semi-automated approach). The reference standard was location of the resected area and outcome one year after operation.

Accuracy was 61% (95% CI: 45-76%) for the fully automated approach and 78% (95% CI: 62-89%) for the semi-automated approach.

Automated ESI has an accuracy similar to previously reported neuroimaging methods.

Automated ESI will contribute to increased utilization of source imaging in the presurgical evaluation of patients with epilepsy [1].

[1)]

Baroumand AG, van Mierlo P, Strobbe G, Pinborg LH, Fabricius M, Rubboli G, Leffers AM, Uldall P, Jespersen B, Brennum J, Henriksen OM, Beniczky S. Automated EEG source imaging: A retrospective, blinded clinical validation study. Clin Neurophysiol. 2018 Sep 24;129(11):2403-2410. doi: 10.1016/j.clinph.2018.09.015. [Epub ahead of print] PubMed PMID: 30278389.