Contributions of MEG to the presurgical mapping of linguistic functions*

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In order to provide valid information in the context of presurgical evaluation, a given neuroimaging tool relies on its ability to record and characterize function-specific activity of the brain. Due to its spatiotemporal resolution, unmatched by other non-invasive techniques, MEG can potentially provide new insights to the study of cortical representation of linguistic functions, and therefore, contribute to addressing clinically relevant questions. This lecture will review some of the findings supporting MEG as a valid clinical tool to characterize linguistic operations.

First, and following a brief introduction to MEG (its merits and limitations), we will discuss aspects of the experimental design and analysis of MEG-derived data affecting the ability of this technique to obtaining valid and replicable profiles of activation associated to linguistic processing (i.e. word comprehension, speech production, reading). Second, we will review studies where MEG-derived estimates of linguistic function have been compared to those obtained by «gold standard» measurements of hemispheric dominance (i.e. intracarotid amobarbital test) and language cortex localization (intra- extraoperative cortical stimulation). Third, we will describe evidences of reorganization in the cortical representation of linguistic operations triggered by new experiences (i.e. learning new skills, intensive speech therapy) or by the presence of pathological processes (i.e. epilepsy, brain tumors, stroke).

MEG is a non-invasive and repeatable procedure that has great potential as an alternative to invasive clinical procedures for functional mapping contributing greatly to our understanding of the cortical representation of linguistic functions.