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Reporting EEG Source Imaging clinical studies in the BigBrain space: an open challenge to compare results

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While there are many studies using Electrophysiological Source Imaging (ESI) for clinical applications, there is a crisis in comparing results due to many factors. Some problems are related to experimental and clinical trial design or statistical methodology. These problems may be difficult to resolve in the short term. However, some problems, which are more feasible to solve, are related to the lack of standard datasets to compare methods. This problem is compounded by the diversity of ESI methods as well as the lack of an updated standardized atlas that allows interpretation of ESI against the background of other aiming modalities and neuroscience data.
As a contribution to facilitate solving the methodological problem mentioned we present two developments from our group:

- We announce an open-source dataset that can help future comparisons (https://osf.io/6jd7y/). This dataset contains clinical, cognitive, motor, and EEG data from a clinical trial of a pharmacological agent to improve cognitive function in patients with Parkinson's disease [1]. We have shown that quantitative EEG (as a proxy for brain function) mediates the effect of the intervention on cognitive function.
- We show how the statistical results of this mediation study (and for that matter any other studies) can be easily morphed into the BigBrain space. We provide a simple workflow to carry out this step.

We offer the challenge to reanalyze this dataset (with any ESI methods of choice) and to produce standardized results. Data and programs will be shared via the CONP.

Reference:

[1] Bringas Vega, M. L., Pedroso, Ibáñez, I., Razzaq, F. A., Zhang, M., Morales Chacón, L., Ren, P., Galan Garcia, L., Gan, P., Virues Alba, T., Lopez Naranjo, C., Jahanshahi, M., Bosch-Bayard, J. F., & Valdes-Sosa, P. (2022). The Effect of Neuroepo on Cognition in Parkinson 's Disease Patients Is Mediated by Electroencephalogram Source Activity. Frontiers in Neuroscience, 16(June), 1–11. https://doi.org/10.3389/fnins.2022.841428

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