Study of resting state cortico-cortical synchronization aimed to accuratelly discriminate Parkinson and essential tremor patients. A MEG signal-space connectivity study

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Purpose
The discrimination of Parkinson disease (PD) patients in the beggining of the development of the disease is essential to contain the evolution of the symptoms and the neurodegeneration. However, it is not easy to discriminate PD patients from essential tremor (ET) patients in these stages.

Methods
We recorded five minutes of MEG resting state data from 11 PD and 17 ET patients. The data was segmented in 4 seconds artifact-free segments and filtered in the classical bands (theta, alpha, beta and gamma). Using a 3T MRI image and FreeSurfer parcellation software we placed 4 distributed sources in each one of the following areas: premotor cortex, primary motor area, somatosensory area and thalamus. The source-space time series for each source and band was reconstructed using LCMV beamformer. After this, we computed the phase locking value (PLV) index between each pair of source, and averaged the values to obtain one PLV for each pair of areas.

Results
The results showed a statistically significant higher connectiviy between regions in PD patients in theta band. This can be observed specially in the links between the right thalamus and the cortical regions in both hemispheres.

Conclussion
PD patients seem to show a greater functional connectivity in slow frequencies than ET patients. This can both be a point to study the efects of the disease in the central system and a new biomarker to diagnose PD in early stages of the disease.