

Visual, Salience and Motor Networks are Related to Tremor Recovery after Stereotactic Radiosurgical**Thalamotomy: A Resting-State fMRI Study**

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Introduction

Essential tremor (ET) is the most common movement disorder. Drug-resistant ET can benefit from standard procedures (deep brain stimulation, thalamotomy) or minimally invasive high-intensity focused ultrasound (HIFU) or stereotactic radiosurgical thalamotomy (SRS-T). Resting state fMRI (rs-fMRI) is a non-invasive imaging method acquired in absence of a task. We examined whether rs-fMRI correlates with tremor score on the treated hand (TSTH) improvement 1 year after SRS-T.

Methods

We included 17 consecutive patients treated with left unilateral SRS-T in Marseille, France. Tremor score evaluation and rs-fMRI were acquired at baseline and 1 year after SRS-T. Resting-state data (34 scans) were analyzed without a priori hypothesis, in Lausanne, Switzerland. Based on degree of improvement in TSTH, to consider SRS-T at least as effective as medication, we separated two groups: 1, $\leq 50\%$ ($n=6$, 35.3%); 2, $> 50\%$ ($n=11$, 64.7%). They did not differ statistically by age ($p=0.86$), duration of symptoms ($p=0.41$) or lesion volume at 1 year ($p=0.06$).

Results

We report TSTH improvement correlated with interconnectivity strength between salience network with left claustrum and putamen, as well as between bilateral motor cortices with right visual association area (the former also with lesion volume). Longitudinal changes showed additional associations in inter-connectivity strength between right dorsal attention network with ventro-lateral prefrontal cortex and salience network with fusiform gyrus.

Conclusions

Brain functional connectivity measured by resting-state fMRI relates to clinical response after SRS-T. Relevant networks are visual, motor and attention. Inter-connectivity between visual and motor areas is a novel finding, revealing implication in movement sensory guidance.

Learning Objectives

By the conclusion of this session, participants should be able to:

- 1- understand the role of resting-state fMRI, as an advanced neuroimaging tool for understanding normal and pathological states, including the use in movement disorders
- 2- have a basic understanding of the statistical approach used for fMRI data analysis
- 3- have a basic understanding on the role of each surgical treatment for tremor (including non invasive, such as radiosurgery and HIFU)

References

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