P81

Oscillating central motor networks of the orthostatic tremor

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Orthostatic tremor (OT) is a movement disorder which involves the legs and trunk when standing upright and is relieved during sitting. The pathological central network involved in OT is still unknown. In this study we analysed 15 OT patients with high resolution EEG. In one patient we were able to record the ventro-lateral thalamus local field potential simultaneously with EEG. The dynamic imaging of coherent source analysis was used which applies a spatial filter to find the sources in the brain that are coherent with the peripheral tremor signal. The network for the tremor frequency constituted a unilateral network of primary leg area, supplementary motor area, primary sensory cortex, two pre-frontal/premotor sources, thalamus and cerebellum for the whole 30 s segment after standing. In all the patients the source signal coherence dynamics was analysed for the primary leg area and the thalamus source signals with tibialis anterior muscle which showed they were highly coherent for the whole 30 s for the contralateral side but coherence decreased after 15 s for the ipsilateral side. The source signal and the recorded thalamus signal followed the same time frequency dynamics of coherence in one OT patient. The result helps us to understand the pathological network of OT and gives a hint that the thalamus takes part in the tremor generation, but at the same time the thalamo-cortical network changes from bilateral to uni-lateral whereas the peripheral coupling remains unaltered. This indicates that thalamus is not the main origin of this tremor.