ALTERED FUNCTIONAL ORGANIZATION OF THE MOTOR SYSTEM RELATED TO ANKLE MOVEMENTS IN PARKINSON'S DISEASE - INSIGHTS FROM FUNCTIONAL MRI

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Gait dysfunction represents one of the cardinal and most incapacitating features of Parkinson’s disease (PD). Investigating the cerebral control mechanisms for human gait and defining the associated functional neuroanatomy is important for understanding gait disorders. In this context, ankle movement functional MRI (fMRI) paradigms have been used to non-invasively investigate supraspinal control mechanisms relevant for gait in healthy subjects, and patients with Multiple sclerosis and stroke. Using such a paradigm in 20 PD patients off medication (mean age 66.8±7.2 years) and 20 healthy controls (HC; mean age 62.3±6.9 years), we here wished to probe for possible activation differences between PD and HC and define functional correlates of gait dysfunction in PD. Active ankle movements versus rest was associated with a robust activation pattern in expected somatotopy involving key motor areas both in PD and HC. However, contrasting activation patterns in patients versus controls revealed excess activation in the patients in frontal regions comprising pre-supplementary motor areas (pre-SMA). The extent of pre-SMA activation did not correlate with behavioural parameters related to gait or motor function, and no differences were seen with the passive paradigms. As pre-SMA activation, noted here with simple repetitive ankle movements in PD patients, is usually associated with more complex movements, this finding might be indicative of higher demand and increased effort in the patients. The missing correlation with behavioural variables and lack of differences with the passive paradigm suggests that this excess activation is not exclusively compensatory and also not hard-wired.