Sensory temporal discrimination and mental rotation of corporal objects in patients with early-onset parkinsonism, positive or negative for mutations in the parkin gene, compared to healthy controls

Petra Katschnig, Gö1 Kaegi, Petra Schwingenschuh, John Rothwell & Kailash P Bhatia

Objective: To test whether sensory temporal discrimination and mental rotation can reveal differences between patients with early-onset parkinsonism, positive or negative for mutations in the parkin gene compared to healthy controls.

Background: Abnormalities in temporal discrimination and mental rotation have been described in various studies in primary dystonia and Parkinson’s disease (PD) supporting the hypothesis of impaired sensory processing and sensorimotor integration in those disorders. So far these methods have not been applied to patients with early-onset parkinsonism and mutations in the parkin gene.

Methods: 6 parkin positive and 6 parkin negative patients with early-onset parkinsonism, and 6 age matched controls were asked to discriminate whether pairs of unimodal (visual, tactile) and crossmodal (visuo-tactile) stimuli were simultaneous or sequential (temporal discrimination threshold, TDT) and which stimulus preceded the other (temporal order judgement, TOJ). In the mental rotation task subjects had to judge the laterality of hands, feet, and a patch in a face which covered the left or right eye. Reaction times (RT) and accuracy were measured.

Results: Patients with mutations in the parkin gene showed significantly higher thresholds for cross-modal TDT and TOJ, whereas parkin negative patients were only impaired in cross-modal TOJ. Accuracy in mentally rotating feet was significantly lower in parkin positive patients than in controls, whereas RT revealed no differences between the groups.

Conclusions: Since temporal discrimination of cross-modal stimuli in contrast to unimodal stimuli requires the integrity of multisensory integration in addition to temporal processing our results rather point to a dysfunction of the former than to defective timing per se. Parkin positive patients were less accurate in rotating feet and interestingly
there is a higher frequency of foot dystonia in these patients. However, we did not find significant differences between patients with and without mutations in the parkin gene, thus rather pointing to a more general deficit of sensory processing and sensorimotor integration in PD than to an association between the deficits and specific genes or pathological processes.

type: presentation (English)
date of publishing: 12-6-2009
event: MDS 13th international Movement disorders congress (Paris)