

ABSTRACT

The basal ganglia (BG) are a group of brain nuclei situated deep in the cerebral hemispheres. While BG were primarily associated with motor functions, in recent years there has been an increasing evidence that BG are also significantly involved in a wide range of non-motor functions. This work focused on some of the non-motor symptoms associated with two typical basal ganglia disorders: Parkinson's disease (PD) and Huntington's disease (HD).

The first study concerned spatial navigation impairment in patients with HD. Their spatial navigation skills were tested using the Blue Velvet Arena, technique evaluating spatial navigation in real space, capable to selectively differentiate between two components of spatial navigation - allocentric (environment-oriented) and egocentric (self-oriented). Allocentric navigation is linked to hippocampal function, whereas egocentric navigation is usually associated with striatum, a structure predominantly affected in HD. We found that spatial navigation is not significantly affected in the early stages of HD and that in more advanced stages, when spatial navigation is already impaired, there is no significant difference between allocentric and egocentric navigation impairment. We speculate that the striatal involvement does not contribute to the impairment of the egocentric navigation in patients with HD.

The second study focused on the detection of cognitive deficit in HD using a short screening test called the Montreal Cognitive Assessment (MoCA). The aim of this study was to assess the concurrent and discriminative validity of the MoCA as a screening tool for cognitive dysfunction in HD, comparing the MoCA with a battery of neuropsychological tests used in HD. The results demonstrated robust psychometric properties of the MoCA in comparison with the given battery. MoCA test can be declared as a suitable tool for detecting and assessing cognitive dysfunction in patients with HD.

The third study studied the prevalence of sleep impairment in patients with untreated early PD. The quality of sleep was assessed using sleep questionnaires, video-polysomnography and multiple sleep latency test. The results show that sleep disturbances may be present from the early stages of PD. REM sleep without atonia was a common finding and correlated with the motor score, while REM sleep behavior disorder was rarely present.

As the most important outcome of the studies mentioned above I consider results of my first study (study A investigating spatial navigation in HD), which did not confirmed the key role of striatum in egocentric navigation. This work was also the first study testing spatial navigation in human HD in real space.

Key words:

Basal ganglia – striatum – Parkinson’s disease – Huntington’s disease – spatial navigation – egocentric navigation – allocentric navigation – Blue Velvet Arena – Montreal Cognitive Assessment – rapid eye movement sleep behavior disorder – rapid eye movement sleep without atonia – daytime sleepiness