Neuroprotective effects of 6-(methylsulfinyl)hexyl isothiocyanate in a mouse model of Parkinson's disease

F. Morroni[1], G. Sita[1], A. Tarozzi[2], G. Cantelli Forti[2], P. Hrelia[1]

[1]Dept. of Pharmacy and Biotechnology, Alma Mater Studiorum – University of Bologna, Italy; [2]Dept. for Life Quality Studies, Alma Mater Studiorum – University of Bologna, Italy.

Parkinson's disease (PD) is a neurodegenerative disorder characterized by the degeneration of dopaminergic nigrostriatal neurons. Although the etiology of the majority of human PD cases is unknown, experimental evidence points to oxidative stress as an early and causal event (Zhou et al., 2008). 6-(Methylsulfinyl)hexyl isothiocyanate (6-MSITC) is a major bioactive compound in wasabi (Wasabia japonica), which is a typical Japanese pungent spice. Several studies demonstrated the pharmacological potencies of 6-MSITC, such as anti-inflammatory (Uto et al., 2005), antimicrobial (Hasegawa et al., 1999), and anticancer (Hou et al., 2000) effects. This study aims to describe the effect of 6-MSITC on brain protection against the parkinsonian toxin 6-hydroxydopamine (6-OHDA). In our study, we employed a pharmacological mouse model of PD, in which we unilaterally injected 6-OHDA in the striatum. This model creates a therapeutic window, that can be used for the investigation of potentially neuroprotective treatments for the disease. After brain lesion, one month of intraperitoneal administration of 6-MSITC rescued motor impairments, as shown by rotarod performance and rotational behavior. Moreover, 6-MSITC provided protection against 6-OHDA-induced death of dopaminergic neurons. 6-MSITC neuroprotection is in part due to the attenuation of oxidative stress burden and to its ability to modulate glutathione levels. Our findings on the behavioral and pathophysiological improvements offered by post-injury 6-MSITC administration clearly suggest a novel molecular mechanisms associated with the pharmacological properties of 6-MSITC. These results lead us to believe that 6-MSITC could be a promising compound for further pharmacological studies on the search for disease-modifying treatment in PD.

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