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Increased melatonin may play dual roles in the striata of a 6-hydroxydopamine model of Parkinson's disease

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Abstract

Aims

To investigate dynamic changes and roles of melatonin (MLT) in the striata of 6-hydroxydopamine (6-OHDA)-treated rats.

Main methods

A Parkinson's disease (PD) rat was established by a unilateral injection of 6-OHDA into the right substantia nigra pars compacta (SNc) and the right medial forebrain bundle (MFB) to achieve a complete lesion of the ipsilateral nigrostriatal DA system. Dialysates were collected in the lesioned striatum at different time intervals by in vivo microdialysis. In addition, both contralateral and ipsilateral striatum tissues were collected at two time intervals (10:00 and 22:00 h) at 3 and 6 weeks after lesioning. The levels of DA, 3, 4-dihydroxyphenylacetic acid (DOPAC) and homovanillic acid (HVA) in the dialysates, as well as MLT in the dialysates and tissues were determined using HPLC.

Key findings

The dialysate contents of DA, DOPAC and HVA in the lesioned striatum were significantly decreased ($P < 0.001$) in comparison with those in the controls or in the unlesioned side 3 weeks after lesioning while the extracellular level of MLT in the lesioned striatum in these corresponding time intervals distinctly increased when compared with those in the controls ($P < 0.05$). The tissue MLT contents increased in the bilateral striata in different degrees at 6 weeks post-lesion ($P < 0.05$). Moreover, increased MLT levels correlate well with rotations or DA changes in the lesioned striatum.

Significance

These data suggest that 6-OHDA lesion manipulates the MLT secretion pattern. Increased striatal MLT level by a unilateral intracerebral injection of 6-OHDA may play dual roles in the progression of PD in rats.