

Colonic inflammation in experimental Parkinson's disease

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Parkinson's disease (PD) is characterized by degeneration and loss of dopaminergic nigrostriatal neurons, responsible for neurologic symptoms. Besides motor signs, most PD patients experience gastrointestinal (GI) disturbances, including dyspepsia and constipation, which impair severely their quality of life. The pathophysiology of digestive disturbances in PD is largely unknown, but recently a link between PD and colonic inflammation has been observed in human biopsies [1]. Our study aims at evaluating some inflammatory patterns in colonic whole wall in a rat model of PD.

PD was induced in rats by unilateral injection of 6-idroxydopamine (6-OHDA) into two sites of the right medial forebrain bundle. Studies were carried out 28 and 56 days after treatment on full-thickness samples from distal colon. The following parameters were examined: tissue malondialdehyde (MDA), an index of membrane lipid peroxidation; tumor necrosis factor (TNF), an index of inflammatory cytokine release; inflammatory cells (eosinophils, mast cells); glial fibrillar acid protein (GFAP) and substance P (SP) expression in myenteric ganglia by immunohistochemical staining.

At both time points 6-OHDA-induced nigrostriatal denervation was associated with significant increase in: a) tissue levels of MDA (membrane oxidative stress) and TNF (tissue inflammation); b) density of eosinophil and mast cell in tunica mucosa and submucosa (inflammatory infiltration); b) GFAP expression in myenteric ganglia of tunica muscularis (enteric glia activation); c) SP expression in myenteric neurons, which is compatible with an enhanced tachykinergic motor control as shown by preliminary functional studies on colonic muscle strips from PD rats.

Our findings suggest that experimental PD, elicited by nigrostriatal dopaminergic degeneration, is associated with an inflammation of the colonic wall involving all layers. These results support the view that peripheral enteric neuroinflammation may account for GI motor dysfunctions in PD.

References

[1] Devos et al., *Neurobiology of Disease*, 2013.

Keywords

Parkinson's disease, experimental model, colon, inflammatory indices, enteric nervous system.