



Chronic impairment of the vagus nerve function leads to inhibition of dopamine but not serotonin neurons in rat brain structures

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Abstract:

Background: Recent clinical studies have shown that the dorsal motor nucleus of the vagus nerve is one of the brain areas that are the earliest affected by α -synuclein and Lewy body pathology in Parkinson's disease. This observation raises the question: how the vagus nerve dysfunction affects the dopamine system in the brain?

Methods: The rats underwent surgical implantation of the microchip (MC) in the abdominal region of the vagus. In this study, we examined the effect of chronic, unilateral electrical stimulation of the left nerve vagus, of two different types: low-frequency (MCL) and physiological stimulation (MCPh) on the dopamine and serotonin metabolism determined by high-pressure chromatography with electrochemical detection in rat brain structures.

Results: MCL electrical stimulation of the left nerve vagus in contrast to MCPh stimulation, produced a significant inhibition of dopamine system in rat brain structures. *Ex vivo* biochemical experiments clearly suggest that MCL opposite to MCPh impaired the function of dopamine system similarly to vagotomy.

Conclusion: We suggest a close relationship between the peripheral vagus nerve impairment and the inhibition of dopamine system in the brain structures. This is the first report of such relationship which may suggest that mental changes (pro-depressive) could occur in the first stage of Parkinson's disease far ahead of motor impairment.

Key words:

vagus nerve, electrical stimulation, dopamine metabolism, serotonin metabolism, brain structures, rat
