Behavioral and electrophysiological effects of 5-HT in the subthalamic nucleus of Parkinson's disease Rats

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Abstract: Objective The subthalamic nucleus (STN) plays a critical role in movement regulation. It is well known that the firing rate and pattern of the subthalamic neurons is directly related to the manifestation of Parkinson's disease. Lots of evidence have confirmed that 5-HT participates the pathophysiological processes in several movement disorders. Morphological studies indicated that STN receives serotonergic innervation from the raphe nuclei and expresses several serotonergic receptor subtypes. The present study is to determinate the modulation and the possible electrophysiological mechanism of 5-HT in STN on parkinsonian rigidity. Methods Haloperidol-induced catalepsy rats preparation, behavioral tests and in vivo extracellular recording were performed in the present studies. Results (1) In the bar tests, bilateral microinjection of 0.1 mM 5-HT into the subthalamic nucleus significantly reversed haloperidol-induced catalepsy (P<0.05, n=10). Compared with control group, the total descent latency time of 60 min was shortened obviously. The ant cataleptic effect began from 20 min after microinjection and reached the strongest at 30 min. (2) In normal rats, electrophysiological experiments indicated that in recorded 47 subthalamic neurons, 5-HT (0.1 mM) decreased the frequency of spontaneous discharges of 15 neurons by an average of 26.08±4.58% (P<0.01). Meantimes, the other 32 neurons was excited by 5-HT, whose frequency was inceased by 32.02±4.31% (P<0.001). Conclusion Our present behavioral study showing that microinjection of 5-HT into the subthalamic nucleus reversed haloperidol-induced
catalepsy. The electrophysiological experiments suggests that 5-HT may regulate the activity of the subthalamic nucleus neurons, especially the inhibitory effect and therefore exert the anticaataleptic effects.

**Key Words:** 5-HT; subthalamic nucleus; Parkinson's disease

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