HYPOXIC CHEMOREFLEX IN PARKINSONISM: ROLE OF PERIPHERAL VS. CENTRAL DOPAMINE.

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Dopamine (DA), acting through D2 receptors, is stimulatory for ventilation at the central level and inhibitory peripherally at the carotid body level. In the carotid body, DA is the putative neurotransmitter involved with the generation of the hypoxic ventilatory response (HVR). Information about respiration in Parkinson's disease (PD), in which DA is centrally deficient, is conflicting, with the reports showing impaired or unchanged respiration. The possible role of carotid body DA in parkinsonic ventilation has by far escaped verification. Therefore , the objectives of the present study were to examine ventilation in experimental parkinsonism and to attempt to discern between the central and peripheral role of DA in ventilation using pharmacological manipulations. The study was conducted in a reserpine model of parkinsonism in the rat; symptoms were confirmed by behavioral tests. Ventilation and its acute responses to 8% hypoxia were measured in a whole body plethysmograph. The results were referenced to healthy rats. We found that the HVR was appreciably depressed in parkinsonism. The peripheral D2 antagonist domperidone, which increased the HVR in healthy rats, failed to influence the dampened parkinsonic HVR. However, the central D2 agonist L-DOPA significantly increased the parkinsonic HVR. Interestingly, we incidentally found that behavioral changes in response to domperidone/DOPA did not parallel changes in respiration. We conclude that the missing central stimulatory element of dopamine action, rather than changes in carotid body DA, underlies the impairment of HVR in parkinsonism. The behavioral symptoms of parkinsonism seem to have separate neurotransmitter background from that of respiration.