Dopamine Agonists and the Suppression of Impulsive Actions in Parkinson's Disease

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Abstract

The suppression of impulsive actions is an essential facet of human cognitive control that has been linked to frontal-basal ganglia circuitry. Basal ganglia dysfunction caused by Parkinson's disease (PD) disrupts the proficiency of action suppression, but how pharmacotherapy for PD impacts impulsive action control is poorly understood. Dopamine agonists improve motor symptoms of PD, but also provoke impulsive-compulsive behaviors (ICB) in a subset of patients. We investigated whether dopamine agonist medication has a beneficial or detrimental effect on impulsive action control in PD. Thirty-eight PD patients, half of whom had current ICB, performed the Simon conflict task both on and withdrawn from their agonist medication. The Simon task measures one's susceptibility to acting on spontaneous action impulses as well as the proficiency of suppressing these impulses as an act of cognitive control. Compared to the off state, patients on their agonist were no more susceptible to reacting impulsively, but they were less proficient at suppressing the interference caused by the activation of impulsive actions. Importantly, the impact of agonist medication on the suppression of impulsive actions depended on baseline performance in the off agonist state. Patients with active ICB were no more susceptible to making fast, impulsive response errors than patients without ICB, suggesting that problems with impulsive behavior in this vulnerable subset of patients may not be related to impulsivity in the motor domain. Our findings show that agonist medication exerts a direct impact on a key component of action control.

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