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Effect of Nicotine on the Reinforcing Effects of Cocaine in a Nonhuman Primate Model of Drug Use

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Abstract : With no FDA-approved treatments for cocaine use disorders (CUD), research has focused on the behavioral and neuropharmacological effects of cocaine in animal models, with the goal of identifying novel interventions. While the majority of people with CUD also use tobacco/nicotine, the majority of preclinical cocaine research does not include the co-use of nicotine. The present study examined nicotine and cocaine co-use under several conditions of intravenous drug self-administration in monkeys. In Experiment 1, male rhesus monkeys (N=3) self-administered cocaine (0.001-0.1 mg/kg/injection) alone and cocaine+nicotine (0.01-0.03 mg/kg/injection) under a progressive-ratio schedule of reinforcement. When nicotine was added to cocaine, there was a significant leftward shift and significant increase in peak break point. In Experiment 2, socially housed female and male cynomolgus monkeys (N=14) self-administered cocaine under a concurrent drug-vs-food choice schedule. Combining nicotine significantly decreased cocaine choice ED50 values (i.e., shifted the cocaine dose-response curve to the left) in females but not in males. There was no evidence of social rank differences. In delay discounting studies, the co-use of nicotine and cocaine required significantly larger delays to the preferred drug reinforcer to reallocate choice compared with cocaine alone. Overall, these results suggest drug interactions of nicotine and cocaine co-use is not simply a function of potency but rather a fundamentally distinctive condition that should be utilized to better understand the neuropharmacology of CUD and the evaluation of potential treatments.

Keywords : polydrug use, animal models, nonhuman primates, behavioral pharmacology, drug self-administration
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