

Abstract View

CUE-INDUCED CERTAINTY, UNCERTAINTY, AND ERRORS IN PREDICTING COCAINE REWARD INFLUENCES NACC DA RESPONSES TO SELF-ADMINISTERED COCAINE

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Empirical studies have shown that reward uncertainty and reward prediction errors cause alterations in midbrain dopamine (DA) neuronal activity that are crucial for natural reward-associative learning. However, the impact of these cognitive factors on nucleus accumbens (NAcc) DA levels during cocaine-associative learning is yet to be confirmed. In the current study, associations between sensory cues (olfactory+visual) and cocaine self-administration opportunities were manipulated during training to produce cue-induced expectation, non-expectation and uncertainty of receiving cocaine reward. Training sessions consisted of 16 alternating days of cocaine (0.5 mg/kg/inj) and non-rewarded (saline) self-administration sessions in conjunction with cue pairings. NAcc DA and locomotor responses to cocaine were assessed 24 hrs after the last self-administration session under 3 differently cued test conditions. In all conditions, animals were placed in the operant chamber and allowed a single self-administered cocaine injection (1.5 mg/kg). However, just prior to cocaine self-administration, specific sensory cues were placed in the chamber according to test condition: Cues associated with cocaine (Certainty); cues associated with non-reward (Prediction Error); and cues equally associated with cocaine and non-reward (Uncertainty). Findings revealed that equal doses of cocaine induced significantly greater NAcc DA increases in the Uncertainty condition than in Certainty and Prediction Error conditions. Cocaine-induced locomotor activity was significantly higher in both Uncertainty and Certainty conditions as compared to the Prediction Error group. The data suggest that correct or incorrect expectations of obtaining cocaine have unequal influence over physiological effects of cocaine. However, uncertainty regarding forthcoming cocaine reward potentiates behavioral and NAcc DA responses to self-administered cocaine. *Support Contributed By: RO1DA14640 to C.L.D. and a UT WCAAR Jones/Bruce Fellowship to M.S.D.*

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