

The impact of stress on cocaine self-administration

*Van der Kam EL*, Ellenbroek BA, Cools AR

Department of Psychoneuropharmacology, Nijmegen Institute of Neuroscience, Radboud University Nijmegen, Nijmegen

Individual susceptibility to the use and misuse of drugs of abuse, like cocaine, is a well-known phenomenon in animals. Several studies have revealed that the mesolimbic and striatal dopaminergic system are involved in determining the amount of cocaine taken during the acquisition phase. Studies have also shown that several stressors can enhance the response to drugs of abuse, resulting in a heightened intake of cocaine in the acquisition phase.

Although these studies have provided evidence for the involvement of the striatal dopaminergic system and stress in the acquisition of cocaine self-administration, the precise interaction between these two factors is less known. One of the limiting factors is the lack of a genetic model that has innate difference in the (re)activity of the striatal dopaminergic system and the HPA-axis.

This study, therefore, made use of the APO-SUS/ APO-UNSUS rat model. The APO-SUS animals are, in comparison to their counterpart APO-UNSUS, characterized by a higher amount and density of dopaminergic D2 receptors in the striatum and a higher stress-induced dopaminergic activation of the nucleus accumbens as measured by in vivo microdialysis. In addition, the APO-SUS animals have a stronger and longer lasting increase in ACTH and corticosterone than the APO-UNSUS animals.

The effects of mild environmental changes have been examined in the two types with the cocaine self-administration paradigm. Under habituated circumstances the APO-UNSUS animals have a heightened intake of cocaine, whilst during stressful circumstance the APO-SUS animals have a heightened intake. This change in susceptibility to cocaine is independent of the presence of cues, learning problems, and/or locomotor activity.

Elizabeth L. van der Kam, Department of Psychoneuropharmacology (234), Radboud University of Nijmegen, PO Box 9101, 6500 HB Nijmegen, t 024 36113698, e-mail [e.vanderkam@pnf.umcn.nl](mailto:e.vanderkam@pnf.umcn.nl)

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