Low-anxiety rats are characterised by long-lasting greater susceptibility to amphetamine in the place preference test

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This study utilised the conditioned place preference test (CPP) to assess the behavioural effects of amphetamine. We used low-anxiety (LR) and high-anxiety (HR) rats that are known to have different fear-conditioned response strengths, different susceptibility to amphetamine in the TIPS procedure and different amphetamine-dependent frequency-modulated (FM) 50-kHz ultrasonic vocalisation (USV) responses. We have found that during the CPP test and after repeated amphetamine administration (8 daily injections) followed by a 14 day withdrawal period, the effects in a drug-paired compartment and on USV were stronger in LR rats in comparison to HR rats. LR rats vocalised much more intensively and spent more time in the amphetamine-paired compartment. We also used immunocytochemistry to examine changes in the expression of D1 and NMDA receptor 2B (GluN2B) subunit in the subcortical brain regions of HR and LR rats in response to the re-exposition to amphetamine-paired compartment in CPP test followed by a withdraw period. The LR rats showed more D1 and GluN2B expression in the nucleus accumbens core, showed more GluN2B expression in the ventral tegmental area, and increased expression of D1 receptors in the central amygdala. The data revealed that the differences between HR and LR rat are reflected not only in amphetamine sensitisation models, but also in the CPP model which measures the reinforcing potency of amphetamine. These results indicate a long lasting greater susceptibility of the LR rats dopaminergic system to amphetamine. Understanding the neurobiological factors that contribute to emotional disorders and sensitisation to psychostimulants is essential for developing future effective psycho- and pharmacotherapies.

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