BRAIN METABOLISM IN LEWIS AND FISCHER 344 RATS AFTER MORPHINE SELF-ADMINISTRATION AND EXTINCTION: A PET IMAGING STUDY

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Aims: The use of inbred strains of rodents to identify inherited traits that might predict susceptibility to reinforcing properties of abused drugs may be a valuable model.
In this work we have examined the brain metabolic response in Lewis (LEW) and Fischer 344 (F344) inbred rats after morphine self-administration and extinction as measured by Positron Emission Tomography (PET).

Methods: Male LEW and F344 rats (N=6-8 in each group) self-administered morphine (1 mg/kg) or saline (0.9 % NaCl) in daily 12-h sessions for 15 days, and they subsequently were submitted to an extinction period (saline substitution) for another 15 days.
After finishing the last session of these periods, changes in the 18F-Fluorodeoxyglucose brain metabolism were imaged in a dedicated small-animal PET scanner and analyzed with the SPM5 software.

Results: Control (saline self-administered) LEW animals exhibited higher metabolism than F344 rats in many cortical regions including the motor, somatosensory, insular, piriform, parietal, auditory, entorhinal and visual cortices.
LEW morphine self-administered animals also showed a higher metabolism in somatosensory, parietal and auditory regions compared to F344 rats. After the extinction, some of these between strains metabolic differences in morphine self administered animals were still maintained.

Conclusions: These results suggest that there is an inherent different brain metabolism in many cortical regions of LEW and F344 rats which even is partially maintained after morphine self-administration and extinction in some cortical areas.

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