NEUROCHEMICAL EFFECTS OF POST-WEANING SOCIAL ISOLATION IN ADULT RAT BRAIN

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Schizophrenia is a chronic and severe psychiatric disorder which typically begins in late adolescence or early adulthood and it is characterized by psychotic periods with positive symptoms separated by periods with negative symptoms. Numerous efforts have been made to develop animal paradigms of schizophrenia in order to mimic characteristic neurobiological and behavioural features of the human disease [(1)]. One of the so-called "environmental model" of schizophrenia is the isolation rearing of rats [(2)], which provides a non-pharmacological and developmental specific method of inducing schizophrenic-like behavioral deficits [(3)].
The prefrontal cortex (PFC) plays a major role in the pathophysiology of schizophrenia. Thus, a neurochemical study on the activity of serotonergic system in the PFC was carried out on socially isolated (ISO) or group-housed (GRP) male Wistar rats. *In vivo* microdialysis technique was used in freely moving rats. Morphine (5 mg/kg s.c.) stimulation was performed in ISO animals and their controls, examining the PFC for serotonin (5-HT) and its metabolite, 5-hydroxyindolacetic acid (5-HIAA). While basal levels of 5-HT did not differ between housing conditions, the time course of 5-HT efflux produced by morphine was delayed in GRP rats ($F_{(8,96)}$=3.713; P=0.019). Moreover, basal levels of 5-HIAA in ISO group were significantly higher than GRP animals ($F_{(1,6)}$=6.421; P<0.05). Morphine injection significantly reduced 5-HIAA over the observation period in ISO rats.
Then, the effects of a locally applied depolarising pulse of potassium ions (100 mM for 20 min) was examined in ISO rats and their controls. Results showed that high K^+-induced increase in extracellular 5-HT levels was potentiated in isolation-reared rats. There was no effects of high K^+ perfusion on 5-HIAA levels.
In conclusion, our experiments suggest a different sensitivity of serotonergic transmission in the PFC of isolation-reared rats with respect to control animals. These data add to the growing body of evidence implicating the central serotonergic system in neurochemical abnormalities observed in animals deprived of social contact from an early post-weaning age.

References

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