DEGREE OF DOCTORATE IN PSYCHOLOGY

Marmendal, M. 2005. *Maternal Separation in the Rat: Long-term Effects of Early Life Events on Emotionality, Drug Response and Neurobiology*. Doctoral dissertation, Department of Psychology, Göteborg University, Sweden.

Abstract

Exposure to early stress and emotional trauma in humans are associated with an increased risk to develop psychiatric disorders, for example, anxiety, depression and drug abuse. Furthermore, disruptions in stress hormone and neurotransmitter levels as well as structural changes in the brain have been connected to early adversities. Animal models have been developed to experimentally investigate early experiences. In the rat, maternal separation of pups in early ages have been linked to anxiety-related behavioral, endocrinological and neurochemical disruptions in the rat. The aim of the thesis was to investigate these proposed disruptions in pups exposed to repeated maternal separation (MS; 3-4 h/day) during the first two weeks in life relative to controls exposed to brief (3-5 min) daily handling procedure. Behaviorally, anxiety-related behaviors, voluntary alcohol intake and sensitivity to amphetamine were investigated in adult Wistar rat offspring. Furthermore, brain opioid peptides, monoamines, corticosterone levels and weight of adrenal and thymus glands were measured. When separating pups as intact litters kept in incubators, there were mainly no alterations in emotionality, amphetamine-induced locomotor activity, opioid peptide levels or in plasma corticosterone levels in MS offspring, either in males or females. Alcohol intake was, however, intitially decreased in MS females, although total alcohol intake for one week was not affected. When separating pups in intact litters, MS males showed increased weight of adrenal glands, which may reflect a disruption of the HPA axis. When changing the experimental protocol, and separating pups in isolation, the manipulation caused decreased anxiety-related behavior in the offspring. Animals that experienced a temperature challenge while separated (i.e. isolated in room temperature instead of isolated in incubators) showed even more signs of decreased emotionality. There were no significant changes in alcohol intake or in brain monoamine and plasma corticosterone levels compared to controls with this protocol. Maternal care behavior has been reported to be disrupted by prolonged separation episodes. However, when studying the dams' retrieval behavior of the pups in the present thesis, no negative effects were observed. With respect to the MS protocols used in the present thesis, the results do not provide support for the suggestion that MS manipulations causes enhanced anxiety or disruptions in endocrinology and neurochemistry in the adult rat. These findings could reflect a parallel to human conditions as relatively good psychosocial functioning is sometimes seen despite serious adverse experiences in childhood.

Key words: Alcohol intake, Anxiety, Corticosterone, Early deprivation, Emotionality, HPA axis, Maternal care, Maternal separation, Monoamines, Opioid peptides

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