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INTERACTIONS OF GENETIC AND ENVIRONMENTAL FACTORS SHAPING ADULT STRESS VULNERABILITY: POSSIBLE ROLE OF BRAIN VASOPRESSIN?

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Repeated exposure to stress in utero (prenatal stress; PS) or to periodic maternal deprivation (PMD) in the immediate post partum period has been shown to chronically alter emotional and neuroendocrine measures of the offspring. Here we tested the hypothesis that genetic factors may interact with such early life experiences comparing Wistar rats selectively bred for high (HAB) and low (LAB) anxiety-related behaviour. For PS, pregnant dams were daily exposed to maternal defeat as a psychosocial stressor and to restraint between days 5 and 20 of pregnancy. For PMD, litters were daily separated from their mother for 3 h. At the age of 12 weeks, the anxiety-related behaviour on the plus-maze and/or on the modified holeboard, as well as the

responsiveness of the hypothalamo–pituitary–adrenal (HPA) axis to a mild stressor were quantified.

Exposure of male HAB and LAB rats to PS or PMD resulted in contrasting effects on anxiety-related behaviour in adulthood with HABs becoming less and LAB rats becoming more anxious compared to their unstressed controls. Thus, early life stress attenuated the extreme behavioural traits in both lines. Further, after PMD, the hyper-responsiveness of the HPA axis to acute stressors accompanying hyper-anxiety became attenuated in HAB rats, whereas, in LAB rats, HPA axis responses tended to increase after PMD. Also, line-dependent differences in the effects of prenatal stress on the expression of the neuropeptides vasopressin and CRH within the hypothalamic paraventricular nucleus were found which help to explain the differential effects of prenatal stress on behavioural parameters.

The data implicate differential effects of exposure to early life stress on adult behavioral and neuroendocrine stress responses which are dependent upon the genetic predisposition of the animal to either high or low anxiety-related behaviour. The evolutionary advantage of these opposing effects of early life stress may be that the genetic variability among individuals of a species is sustained while allowing flexible and adequate responses to stressful and potentially dangerous stimuli in adulthood.

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