Delayed Weaning Influences Depressive, But Not Anxiety-like Or Social Behaviour In Rats

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There is evidence to suggest that exposure to maternal milk can influence the ontogenesis of µ- and δ- (DOP) opioid receptors. We have shown that weaning rat pups at day 21 activates DOPr development in cortical brain regions and this activation was shown to be dependent on the loss of dietary casein, which is known to produce peptide fragments that can exert opioid activity (Goody and Kitchen, 2001). The DOPr system is known to play an important role in mediating mood and social behaviour and transgenic mice lacking DOPr exhibit depressive and anxiogenic phenotypes (Filliol et al., 2000). We therefore hypothesise that time of weaning or exposure to maternal milk may influence mood and social behaviour via a DOPr mediated mechanism. The aim of this study was to investigate the effect of weaning time on anxiety, depressive and social interaction behaviours.

Weaned and non-weaned male Wistar albino rats were used for this study. Weaned rats were separated from their mothers at postnatal day 21 and then housed without their mothers, whilst non-weaned groups remained with their mother at all times except during behavioural testing. Different groups of weaned and non-weaned rats were subsequently tested for anxiety, despair-like and social approach behaviours with the use of the elevated plus maze, forced swim test, and three-chambered box respectively, on postnatal day 25. Rats weaned at a normal age (postnatal day 21) showed lower depressive-like behaviour compared to non-weaned rats, as evidenced by a significant reduction of immobility time (152 ±31.5 sec vs 260 ±13.5 sec, p < 0.01, Student’s T-test, n=6) and an increased latency to the first period of immobility (50.3 ± 3.7 sec vs 10.2 ± 4.5 sec, p < 0.001, Student’s T-test, n=6), as measured in the forced swim test. In addition, only the weaned animals exhibited diving behaviour, a key indicator of anti-depressant activity. No significant differences were found in anxiety-like (51 ±13.9 sec vs 36.5 ±9.5 sec, Student’s T-test, p > 0.05 n=6) or the two components of the social behaviour test, sociability and preference for novelty (two-way repeated measures ANOVA with the factor of chamber and treatment, P > 0.05, n=6) between the two groups. These findings provide the first evidence to show that weaning time may influence depressive-like behaviour. Whether this is mediated by a DOPr mechanism remains to be determined.
