

Changes in HPA axis responsiveness and behavior after prenatal stress exposure and maternal separation in young male adult rats

V. Locci¹, F. Biggio², M.G. Pisu³, G. Boero², M. Serra^{2,3}

¹Dept. of Biomedical Science, University of Sassari, 07100 Sassari, Italy

²Dept. of Life and Environmental Sciences, Center of Excellence for Neurobiology of Dependence, University of Cagliari, 09100 Cagliari, Italy

³CNR Institute of Neuroscience, 09100 Cagliari, Italy

It is now known that stressful events that occur in key periods of life, such as pregnancy and adolescence, can cause long-term consequences on the behavior and development in adulthood (Weinstock M., 2008). Therefore vulnerability to psychopathologies in the adult can be predicted from the prenatal as well as postnatal experiences. We wanted to assess whether a moderate dose of ethanol (1g/kg), during the last days of pregnancy (GD17-20) followed by early maternal separation (MS 3h, PND 3-15) alters emotional behavior and sensitivity to acute stress in adult offspring. Given that maternal separation stimulates the activity of the HPA axis in dams, and changes in levels of corticosterone affect the quality of maternal care (Rees et al., 2004), we investigate whether prenatal exposure to ethanol could be affected by maternal behavior. Therefore, maternal care level and dams corticosterone levels were measured during the first two postnatal weeks of life and at weaning, respectively.

The responsiveness of the HPA axis to stressful conditions was evaluated in young adult male rats by measuring the basal and foot shock-stimulated plasma levels of corticosterone as well as allopregnanolone.

We found that prenatal ethanol exposure and subsequent maternal separation (EtOH-MS group) resulted in a decrease in plasmatic corticosterone and allopregnanolone levels compared to counterpart not subjected to maternal separation (EtOH-NMS). Furthermore, the enhancement of corticosterone and allopregnanolone levels induced by foot-shock stress in EtOH-MS was remarkably increased in comparison with animals that were just exposed to prenatal ethanol. Besides, elevated plus maze test shows an increase in anxious behavior in EtOH-MS group compared to counterpart (EtOH-NMS). We discovered that maternal separation induced an increase in arched-back nursing and pup-licking in mothers not exposed to ethanol (Biggio et al., 2014). Furthermore, it is interesting that the maternal care of dams separated from their pups are not affected by exposure to ethanol during the last days of pregnancy. This result suggests that changes in emotional state and stress response in animals subjected to prenatal stress and subsequent maternal separation is not influenced by the quality of maternal care received. In conclusion, stressful events that occur during pregnancy and childhood may alter the responsiveness of HPA axis in adulthood.

Weinstock M., 2008. *Neurosci Biobehav Rev.* 32(6):1073-86

Rees S.L., et al, 2004. *Horm.Behav.* 46, 411-419

Biggio F., et al, 2014. *Eur Neuropsychopharmacol.* 24(7):1152-61