

Poster presentation

## Gender, neonatal handling and pubertal stress affect cognitive abilities.

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### Background

Early experiences affect brain development and yield long term changes in the neurobiology and behavior of the offspring. Neonatal handling, an experimental paradigm for early experiences, modifies the function of the limbic system – HPA axis and improves the organism's ability to cope with stress in males. Corticosteroids act through their type-1 (MR) and type-2 (GR) receptors. Corticosteroid binding to hippocampal MRs and GRs affects spatial learning and memory, a process also influenced by the basal forebrain cholinergic system. It is well known, that there are sex differences in both HPA axis function and cognition. Puberty is the last step in brain development and marks an important phase with regard to sexually dimorphic cognitive performance and behavior. Based on the above, we studied the effect of neonatal handling and pubertal chronic forced swimming stress on spatial learning of adult male and female rats following an acute restraint stress and determined the levels of brain corticosteroid receptors upon termination of the Morris water maze test. Furthermore, we determined the effect of neonatal handling on hippocampal AchE levels of adult male and female rats.

### Material and Methods

Spatial learning and memory were assessed in the Morris Water Maze. Hippocampal MR and GR levels were determined immunocytochemically. Circulating corticosterone levels were measured by RIA. AchE levels were estimated histochemically. Data were statistically analyzed by ANOVA.

### Results

Handled males have a higher ability for learning compared to both handled females and non handled males. Pubertal stress impairs learning only in the non handled males. Memory is affected by handling only in male rats, with handled males outperforming the respective non handled. Pubertal stress cancels this effect of handling. Neonatal handling affects MR and GR levels differently in the two sexes: Handled males have lower MR and higher GR levels compared to the non handled males, while handled females have higher GR and equal MR levels compared to the non handled. Pubertal stress reverses the effect of handling in males and potentiates its effect in females

### Conclusion

Neonatal handling and pubertal stress interact and influence the ability for spatial learning, as well as GR and MR levels in the hippocampus in a sex-dependent way.