Sex Differences in Restraint Stress Related Core Body Temperature in the Long Evans and Sprague Dawley Rat

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Introduction

Most models of stress cause chronic elevations in glucocorticoids and hypothermia.
- Stress can lead to adaptive or maladaptive responses to stress, a distinction that is poorly understood by chronic stress models.
- Instead we use a model of stress habituation which leads to declines in stress hormone levels correlated to sexually dimorphic changes in serotonin.

Hypothesis: Male but not female rats would show declines in sympathetic nervous system activity – measured as core body temperature – correlated to higher sensitivity to 8-OH DPAT hypothermia.

Results

Handling causes hyperthermia

Single restraint causes hyperthermia

Repeat restraint decreases hyperthermia in males

72hrs post restraint anticipatory hyperthermia in females

Summary and Conclusions

- Males and females show declines in stress hormone levels and HPA axis activity.
- Handling causes hyperthermia in male and female rats
- Only males show declines in stress induced hyperthermia, to suggest habituation of the sympathetic nervous system (SNS).
- Females showed sustained hyperthermia up to 72hrs after the end of restraint to suggest a disconnect between the HPA and SNS, greater susceptibility.
- Males show greater 8-OH DPAT induced hyperthermia, indicative of greater 5-HT 1A receptor function (previously observed).
- Changes in 5-HT 1A receptor function may in the DRN underlie habituation of the SNS and HPA axis in males (model).
- We have tested an adeno-viral mediated approach to specifically knockdown the 5-HT 1A receptor in serotonergic cells. We are currently working to demonstrate the essential role of the 5-HT 1A receptor in this design.

Methods

Adult male and female Tph2-Cre Long-Evans and non-transgenic Sprague-Dawley rats were used. Daily handling and exposure to restraint stress was carried out between 0800 and 1130 hours. Anipill (BodyCap) were surgically implanted intraperitoneally to monitor core body temperature.

*Red line indicates time of DPAT injection
*Black bar indicates significantly different than naïve.

*Blue bar is significantly different than single

*Black bar is significantly different than undisturbed

*Means not females

Greater 8-OH DPAT induced hyperthermia in males not females

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*Blue bar is significantly different than single

*Means not females