**Sex comparison of leukocyte Hsp72 mRNA up regulation during heat acclimation**

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**Introduction**

Thermotolerance is acquired following repeated exposure to thermal stress, with phenotypical cellular adaptation, seen - most notably heat shock protein 72 (Hsp72). Thermotolerance reduces disruptions to cellular homeostasis by principally, but not exclusively, increasing basal Hsp72 during and post stress, following transcription of its gene (Hsp72 mRNA), as part of the heat shock response (HSR). Although, stress mediated sex specific differences in the Hsp72 protein have been seen (Morton et al., 2009, Gillum et al., 2013), they have not been examined at an mRNA level via qRT-PCR across the course of heat acclimation (HA). The aim of the current study was to determine whether inhibition of the HSR occurs at an mRNA level via measurement of the leukocyte Hsp72 mRNA response across a heat acclimation programme.

**Methods**

Five physically active males (45.69 ± 4.37 ml.kg-1.min-1) and females (46.23 ± 4.11 ml.kg-1.min-1) performed 10 controlled hyperthermia HA sessions. HA sessions involved a 90 minute exposure to 40°C, 40% relative humidity. Exercise intensity was set at 65% V̇O2 max and adjusted with work-rest intervals to maintain a rectal temperature (Tr) of ~38.5°C. Leukocyte Hsp72 mRNA was measured pre and post day 1, 5 and 10 of HA via qRT-PCR to determine the HSR.

**Results**

No differences were observed in mean Tr (*day 1:* 38.25 ± 0.19°C, *5:* 37.95 ± 0.58°C, *10:* 38.21 ± 0.10°C; *p* > 0.05) and heart rate (*day 1:* 149 ± 11 beats.min-1, *5:* 146 ± 9 beats.min-1,*10:* 146 ± 11 beats.min-1; *p* > 0.05) over time or between sexes since controlled hyperthermia HA was adopted. Mean exercise power increased over time (*day 1:* 74 ± 19 W, *5:* 101 ± 27 W, *10:* 107 ± 28 W; *p* ≤ 0.05). Hsp72 mRNA increased pre to post on day 1 (1.70 ± 0.76 fold, 3.92 ± 1.78 fold; *p* = 0.040) and 5 (1.63 ± 0.75 fold, 3.51 ± 1.70 fold; *p* = 0.019), there were no differences on day 10 (1.84 ± 0.54 fold, 3.10 ± 1.44 fold; *p* = 0.299). There were no differences in Hsp72 mRNA expression between sexes.

**Discussion**

Males and females demonstrate comparable physiological strain and HSR to HA. The comparable transcription of Hsp72 mRNA in all participants’ suggests there is no difference in the endogenous criteria to elicit the HSR between sexes. Data suggests translation of leukocyte Hsp72 may be hindered, consequently mitigating the attainment of thermotolerance in females.

**References**

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Gillum T, Kuennen M, Gourley C, Dokladny K, Schneider S, Moseley P. (2013). Int J Endocrinol Metab 11(4), e8739.

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