Reactivity to psychological stress in premenopausal women: Impact of cardiorespiratory fitness and cardio-metabolic risk

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Introduction: Responsiveness to psychological stress has been linked to the aetiology of chronic disease progression (Carroll *et al.*, 2011). Some evidence in men has shown that levels of cardiorespiratory fitness are associated with levels of responsiveness to psychological stress (Rimmele *et al.*, 2009). Nevertheless, the relationship between responsiveness to psychological stress and cardiorespiratory fitness in healthy premenopausal women has not been investigated. We are testing the hypothesis that women with higher cardiorespiratory fitness will have lower blood pressure and heart rate responsiveness to psychological stress compared to aged matched women with lower cardiorespiratory fitness. We are also considering if there are associations between stress reactivity and markers of cardio-metabolic risk.

Methods: To date, 34 healthy, premenopausal women (age 30-50 years) in the follicular phase of the menstrual cycle have been subjected to a cardiorespiratory fitness test ($VO_{2\ peak}$ test) and a well characterised psychological stress test (Trier Social Stress Test, TSST). A fasting blood sample was obtained for profiling of cardio-metabolic risk markers (fasting glucose, C-reactive protein, cholesterol, triglycerides, high-density lipoprotein cholesterol, low-density lipoprotein cholesterol, CHOL/HDLC ratio). Blood pressure and heart rate were measured before, during and after the TSST. Women were ranked according to their cardiorespiratory fitness and allocated to either the high fit or the low fit group (n = 17 per group; target sample size for this study is n = 20 per group). Analysis of variance and Pearson's correlation coefficient were used to analyse data.

Results: Analyses of data collected to date, show that mean (±SEM) $VO_{2\ peak}$ of high fit (43.1 ± 1.9 ml/kg/min) women was significantly higher ($p < 0.001$) compared with that of low fit (28.1 ± 1.2 ml/kg/min) women. Both groups had significant elevations in heart rate, systolic and diastolic blood pressures as indicated by a significant effect of time ($p < 0.001$ for all). Heart rate, systolic and diastolic blood pressure reactivity in response to the TSST were not different between the two groups (time * treatment p = 0.896, 0.634, 0.269, respectively) and there were no overall differences between the groups (treatment p = 0.102, 0.874, 0.203, respectively). Pre-treatment, peak response and reactivity values for heart rate, systolic and diastolic blood pressures did not differ significantly between the groups ($p > 0.05$ for all). For both groups combined, there were no significant correlations between heart rate, systolic or diastolic blood pressure reactivity and $VO_{2\ peak}$ ($p > 0.05$ for all). Furthermore, there were no correlations between heart rate, systolic or diastolic blood pressure reactivity and any of the cardio-metabolic risk markers ($p > 0.05$ for all).

Discussion: Cardiorespiratory fitness may not influence heart rate and blood pressure reactivity to psychological stress in women as it does in men or further separation in levels of cardiorespiratory fitness may be required between the groups to see such an effect. The outcomes may be influenced once a complete set of data is collected.

Carroll D, Phillips AC, Der G, Hunt K & Benzeval M. (2011) *Psychosomatic Medicine* **73**, 737-42.

Rimmele U, Seiler R, Marti B, Wirtz PH, Ehlert U & Heinrichs M. (2009) *Psychoneuroendocrinology* **34**, 190-8.