

## Concurrent Session 11: "Brain food" and School Nutrition

### Skipping breakfast (fasting longer) alters glucose metabolism in lean young adults

GA Heruc<sup>1</sup>, V Tan<sup>1</sup>, JC Brand-Miller<sup>1</sup>, FS Atkinson<sup>1</sup>, P Petocz<sup>2</sup>

<sup>1</sup>Boden Institute of Obesity, Nutrition and Exercise, University of Sydney, NSW

<sup>2</sup>Division of Economic and Financial Studies, Macquarie University, NSW

**Background** – Extended fasting is linked with a deterioration of glucose tolerance. Skipping breakfast on a regular basis has been associated with a 4.5 times increased risk of obesity (1). The effect of prolonged overnight fasting, ie. ‘skipping’ breakfast, on postprandial glucose and insulin responses is largely unknown.

**Objective** – To determine the effect of the duration of overnight fasting on postprandial glycemia and insulinemia, acute insulin sensitivity and subsequent *ad libitum* food intake.

**Design** – A within-subject, repeated measures study was conducted in 24 lean, young adults (12 males, 12 females; mean  $\pm$  SD age  $23.0 \pm 2.6$  years, BMI  $22.1 \pm 2.5$  kg/m<sup>2</sup>). Subjects consumed a standard breakfast after an overnight fast of 12, 14 and 16 h, following consumption of a standard evening meal at 1900 h. Each treatment was studied three times in each subject (3 x 3). Fingerprick capillary blood samples were taken at -20, -10, 0 (3 fasting samples) and 15, 30, 45, 60, 90, 120 minutes after eating had commenced for measurement of postprandial glucose and insulin. Responses were quantified as the area under the curve (AUC) and insulin sensitivity was estimated using homeostasis modelling assessment (HOMA-IR). Subsequent *ad libitum* energy intake following completion of the 120 min experimental sessions was also measured.

**Outcomes** – Increasing fasting duration resulted in an increase in postprandial glucose AUC, with a significant effect of gender ( $P < 0.01$ ). After the 16 h fast, females showed a 37% increase in glucose AUC compared to the 12 h fast ( $P < 0.01$ ), accounting for the overall difference in the total group. Paradoxically, in females, but not males, HOMA-IR improved as the fasting period increased ( $P < 0.01$ ). There was a significant increase in *ad libitum* energy intake with increased fasting duration for all subjects ( $P < 0.01$ ).

**Conclusions** – In females, skipping breakfast (fasting longer) has detrimental effects on glucose tolerance despite apparent improvement in insulin sensitivity. Males show no significant changes with an increased duration of overnight fasting.

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### The relationship of dietary intake to mood and cortisol

SJ Torres, CA Nowson

School of Exercise and Nutrition Sciences, Deakin University, VIC 3125

**Background** – Dietary therapies are routinely recommended to reduce disease risk; however, there is concern they may adversely affect mood and psychological wellbeing.

**Objectives** – To determine if there were any differential effects on mood of a low-sodium, high-potassium diet rich in fruits and vegetables (LNAHK) and a high-calcium diet rich in low-fat dairy foods (HC) compared to a moderate-sodium, high potassium, high-calcium “DASH” diet, high in fruits, vegetables and low-fat dairy foods (OD). To evaluate the relationship between salivary cortisol and dietary factors.

**Design** – In a crossover design, subjects were randomized to two diets for 4 wk, the OD and either LNAHK or HC, each preceded by a 2 wk control diet (CD). Dietary compliance was assessed by 24 h urine collections. Mood was measured weekly by the Profile of Mood States (POMS). Saliva samples were collected to measure cortisol. The change in mood between the preceding CD and the test diet (LNAHK or HC) were compared with the change between the CD and OD.

**Outcomes** – Of the 38 women and 56 men that completed the OD, 43 completed the LNAHK and 48 the HC. The mean (SD) age was 55.6 (9.9) yr and the mean BMI was 29.0 (3.8) kg/m<sup>2</sup>. POMS ratings for anger, depression and tension improved during LNAHK ( $P < 0.05$ ). Compared with OD, there was an improvement in the global mood score for LNAHK ( $P < 0.05$ ). Higher cortisol levels were associated with greater vigour and lower fatigue ( $P < 0.05$ ), and greater urinary excretion of potassium and magnesium ( $P < 0.05$ ).

**Conclusions** – A LNAHK diet resulted in the greatest improvement in mood. The mechanism whereby dietary factors can alter mood is not clear, but the hypothalamic-pituitary-adrenal axis and cortisol may be implicated.