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## Concurrent session 1: minerals

### ACUTE EFFECTS OF AEROBIC EXERCISE ON SERUM ZINC CONCENTRATION – A SYSTEMATIC REVIEW AND META-ANALYSIS

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**Background/Aims:** Zinc is involved in numerous metabolic roles, including energy metabolism, immunity and antioxidative effects. Zinc losses during exercise, in particular through sweat, are well documented. However, conflicting results have been reported for changes in circulating and tissue zinc concentrations following exercise. The present review aims to quantify the acute effects of aerobic exercise on markers of zinc status in humans.

**Methods:** We conducted a systematic review of peer-reviewed papers published up to December 2014 to identify studies that investigated the acute effects of exercise on indices of zinc status. Meta-analyses were conducted to determine changes in serum zinc concentration following exercise.

**Results:** Forty-five studies were included in the systematic review. Sufficient data were available from 34 studies (46 comparisons) to quantify the change in serum zinc following exercise. Serum zinc concentration was significantly higher immediately following exercise ( $0.45 \pm 0.12 \mu\text{mol/L}$ ,  $p < 0.001$ ; mean  $\pm$  SE). Secondary analyses showed greater increase in serum zinc for untrained individuals ( $0.65 \pm 0.19 \mu\text{mol/L}$ ,  $p = 0.001$ ) and exercise sessions that involved running ( $0.71 \pm 0.26 \mu\text{mol/L}$ ,  $p = 0.006$ ) or maximal intensity ( $0.77 \pm 0.20 \mu\text{mol/L}$ ,  $p < 0.001$ ). During exercise recovery, serum zinc concentration was lower than pre-exercise values ( $-1.31 \pm 0.22 \mu\text{mol/L}$ ,  $P < 0.001$ ).

**Conclusions:** This meta-analysis indicated significant changes in serum zinc concentration following aerobic exercise, suggesting acute perturbations in zinc homeostasis. Further research is required to ascertain the long-term effects of exercise on zinc metabolism and potential consequences for dietary zinc requirement for physically active populations.

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### EFFECTS OF FOUR WEEKS SUPPLEMENTATION WITH A MULTIVITAMIN AND MINERAL PREPARATION ON MOOD AND FUNCTIONAL BRAIN ACTIVITY

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**Background/Aims:** Multi-vitamin and/or mineral supplementation is a common form of dietary supplement consumed by adult Australians, most commonly in the absence of a clinical deficiency. This study aimed to explore effects of four weeks multi-vitamin and mineral (MVN) supplementation on neurocognitive function.

**Methods:** Fifty-eight healthy adults, 18–40 years of age ( $M = 25.82$  years,  $SD = 4.87$ ), participated in this randomised, double-blind, placebo controlled trial, in which blood biomarkers, mood, cognitive performance and functional brain activity were assessed at baseline and after four weeks supplementation. Functional brain activity was assessed using

Steady-State Topography (SST) and functional Magnetic Resonance Imaging (fMRI).

**Results:** MVN supplementation was associated with significantly lowered homocysteine (mean change  $\pm$  S.D.; MVN:  $-0.89 \pm 2.12$ , Placebo:  $0.35 \pm 2.05 \mu\text{mol/L}$ ,  $p = 0.01$ ) and increased blood B-vitamin levels. MVN treatment was associated with improved mood, as measured by reduced scores on the depression-dejection subscale of the Profile of Mood States (estimated marginal mean  $\pm$  SEM.; MVN:  $4.39 \pm 0.74$ , Placebo:  $6.86 \pm 0.67$ ,  $p = 0.018$ ). No improvements in cognitive performance were observed, however, analysis of functional brain activity during working memory activation tasks indicated changes in centro-parietal brain activity, using both SST ( $p < 0.01$ ) and fMRI, however the latter was only in a subset under conditions of fatigue ( $n = 16$ , 4 significant clusters,  $p < 0.01$ , minimum 100 voxels).

**Conclusions:** These findings suggest four weeks of MVN supplementation may have beneficial effects on mood and provides preliminary evidence of central activity from MVN supplementation that could potentially alter functional brain activity in healthy young adults.

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### ZINC STATUS OF PREGNANT VEGETARIANS

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**Background/Aims:** Zinc intake and serum zinc concentrations are lower in adult vegetarians compared to omnivores. The additional zinc demands associated with pregnancy and foetal development may dispose pregnant vegetarians to increased risk of zinc deficiency. The present systematic review and meta-analysis compares the zinc intake and status of vegetarian and omnivorous women during pregnancy. The association between vegetarian diets and functional pregnancy outcomes also is considered.

**Methods:** A literature search was conducted of MEDLINE; PubMed; Embase; the Cochrane Library; Web of Science; and Scopus electronic databases up to September 2014. Six observational studies published in English that examined zinc intake and/or status in vegetarian compared to non-vegetarian pregnant women qualified for inclusion in the systematic review.

**Results:** In a meta-analysis of dietary zinc intake, vegetarians were found to have lower zinc intakes than non-vegetarians ( $-1.38 \pm 0.35 \text{ mg/day}$ ;  $p < 0.001$ ). Neither the vegetarian nor non-vegetarian group met the recommended dietary allowance for zinc. In a qualitative synthesis, no differences were found between groups in serum zinc or in functional outcomes associated with pregnancy.

**Conclusions:** Pregnant vegetarians have lower zinc intakes than non-vegetarian control groups, however there is no evidence that this disparity results in adverse effects to the mother or foetus. Further information is needed to determine whether physiologic adaptations in zinc metabolism are sufficient to meet the requirements of pregnancy on a low zinc diet. Meanwhile, dietary advice that increases the zinc intake of both vegetarian and omnivorous pregnant populations to recommended levels is prudent.

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