

## Posters

### Caffeine as a flavour additive in soft drinks

RSJ Keast<sup>1</sup>, LJ Riddell<sup>2</sup>, J Roper<sup>1</sup>, H Thothathiri<sup>1</sup>

<sup>1</sup>RMIT University, Food Science, Melbourne, Victoria, Australia

<sup>2</sup>Deakin University, Health and Behavioural Sciences, Melbourne, Victoria, Australia

**Background** - Caffeine is a central nervous stimulant that, when added to a food or beverage, produces physiological and psychological dependence for that food or beverage. Moreover, caffeine is a bitter stimulus that is added to beverages (eg cola drinks) as a flavour enhancer or modifier. However, does the concentration of caffeine actually modify flavour in soft drinks? If not, caffeine's presence is presumably to aid the development of an individual's physiological and psychological dependence on the soft drink. Such dependence can be considered a consumer health issue, as caffeine is commonly added to high energy dense soft drinks and excessive consumption of soft drinks is one putative cause of diet induced obesity.

**Objective** - To assess whether caffeine can act as a flavour modifier in soft drinks.

**Design** - A human psychophysical study investigating taste perception and taste modification.

**Outcomes** - Thirty subjects (four male, age  $23 \pm 3$ ) participated in the experiments. Caffeine taste thresholds were determined ( $1.03 \text{ mM} \pm 0.42\text{SD}$ ), and dose response curves (0-72 mM caffeine) for each individual were constructed. The intensities of three sweeteners were matched to the sweetness intensity of Coca Cola (iso-intense concentrations: 204 mM sucrose, 1.5 mM aspartame, 0.421 mM sucralose). A series of triangle tests ( $n=1530$ ) were performed using the iso-intense sweeteners solutions as a base. Over a number of days subjects were asked to discriminate between the sweet solutions and the sweet solutions with a range of concentrations of caffeine below their detection thresholds (i.e. concentration at which subjects are unable to detect the presence of caffeine in water), including the concentration of caffeine in Coca-Cola. Subjects could easily discriminate the difference between a sweet solution and the sweet solution with sub-threshold concentrations of caffeine ( $P < 0.001$ ), even at caffeine concentrations 68% lower than the average detection thresholds in water ( $0.33 \text{ mM} \pm 0.25\text{SD}$ ). A directional paired comparison test revealed the addition of subthreshold caffeine to the iso-intense sweeteners significantly decreased the sweetness of solutions ( $P < 0.001$ ). Caffeine, at the concentration in Coca-Cola ( $0.67\text{mM}$ ), was added to the uncaffeinated diet Coca-Cola and using a triangle test discrimination task, none of the subjects were able to discriminate between the caffeinated and uncaffeinated Coca-Cola samples.

**Conclusions** - Sub-threshold concentrations of caffeine inhibit sweetness and thereby modify flavour using this simple model. However, when caffeine, at the concentration in Coca-Cola, was added to a complex soft drink matrix it did not modify the flavour. There is no flavour rationale for the addition of caffeine to soft drinks; addition of caffeine to high energy soft drinks will promote an individual's physiological and psychological dependence on the beverage which may lead to excessive consumption and diet induced obesity.

### The addition of glucose to an oral fat load decreases postprandial triglyceride levels; but not chylomicron levels

AP James, JCL Mamo

School of Public Health, Curtin University of Technology, WA 610; ATN Centre for Metabolic Fitness

**Background** - Impaired postprandial lipid metabolism is now recognised as an independent risk factor for cardiovascular disease. Despite this the factors regulating postprandial lipid metabolism (including chylomicron levels) remain to be determined. A limited number of studies have investigated the effect of the addition of glucose to an oral fat challenge on postprandial triglyceride levels; however the results obtained have been variable. Furthermore the effect on postprandial chylomicron levels is unknown.

**Objective** - To determine the effect of the addition of glucose to an oral fat challenge on the postprandial concentration of triglyceride and chylomicron particles.

**Design** - Randomised cross-over design of lean healthy subjects (aged  $24.8 \pm 2.2$  yr (mean  $\pm$  SEM)) to determine the effect of the addition of glucose (50 g; glucose syrup) to an oral fat load (flavoured milkshake containing 37 g fat) on fasting and postprandial lipid and lipoprotein metabolism. Fasting and postprandial (incremental area under the postprandial curve (corrected for baseline levels)) triglyceride, apo B48 (marker of chylomicron particles), glucose, insulin, NEFA and fasting cholesterol (total, HDL and LDL) were measured.

**Outcomes** - The addition of glucose to an oral fat load increased postprandial insulin levels. Furthermore the postprandial levels of triglyceride were reduced by 50.4% ( $P < 0.05$ ) following the addition of glucose to the fat load. However postprandial apo B48 levels, were identical following either meal.

**Conclusions** - The addition of glucose to an oral fat load significantly reduces postprandial triglyceride levels in lean healthy subjects; however chylomicron particle number is not affected. A number of mechanisms may be responsible for the observed reduction in postprandial lipaemia, but they appear to be independent of those affecting chylomicron levels.