Concurrent Session 11

**Increased protein intake from lean red meat replacing carbohydrate-rich foods lowers blood pressure in hypertensive individuals**

JM Hodgson, V Burke, LJ Beilin, IB Puddey

University of Western Australia, School of Medicine and Pharmacology at Royal Peth Hospital, and the Western Australian Institute for Medical Research, Perth, Western Australia, Australia

**Background** - Inverse associations between protein intake and blood pressure are reported in many population studies. In a randomised controlled trial we have previously shown that increased plant protein intake, in comparison to carbohydrate, can lower blood pressure, but effects of animal protein have yet to be investigated.

**Objective** - To determine if increased animal protein intake in the form of lean red meat, with a concomitant reduction in carbohydrate intake, alters blood pressure in hypertensive individuals.

**Design** - Hypertensive individuals (n=60) were recruited to a parallel-designed study of 8 weeks duration. Participants were randomized to maintain their usual diet (control) or increase net protein intake from lean red meat, replacing energy from carbohydrate-rich foods. Clinic and 24 hour ambulatory blood pressures were measured at baseline and at the end of intervention.

**Outcomes** - Relative to control, there was an increase in protein intake (5.3 (95%CI:3.7, 6.9) % of energy, P<0.001) and a corresponding decrease in carbohydrate intake (-5.3 (-7.9, -2.7) % of energy, P <0.001). Intakes of fat, alcohol and fibre were unchanged. There was a net reduction in clinic, 24 hour, awake and asleep systolic blood pressure with protein (-5.2 (-10.3, -0.1) mm Hg, -4.0 (-7.4, -0.6) mm Hg, -4.7 (-8.9, -0.5) mm Hg and -4.7 (-10.3, -0.1), respectively, P < 0.05). These differences were independent of age, gender, weight change, alcohol intake, and urinary sodium and potassium excretion. Diastolic blood pressure was not significantly altered.

**Conclusion** - The results suggest that modest replacement of carbohydrate-rich foods with protein in the form of lean red meat can lower blood pressure in hypertensive individuals.

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The satiating effect of dietary protein is unrelated to post-prandial ghrelin secretion

LJ Moran\(^1,3\), N Luscombe-Marsh\(^2\), M Noakes\(^1\), GA Wittert\(^2\), JB Keogh\(^1\), PM Clifton\(^1\)

\(^1\)CSIRO Human Nutrition, Adelaide, SA; \(^2\)Dept. Medicine, University of Adelaide, \(^3\)Research Centre for Reproductive Health, Dept. Obstetrics and Gynaecology, University of Adelaide

**Background** - Increasing dietary protein relative to carbohydrate and fat enhances weight loss, at least in part by increasing satiety. The mechanism for this is unclear.

**Objective** - To compare the effect of isocaloric test meals with differing protein-to-fat ratios on fasting and post-prandial ghrelin, insulin, glucose, appetite and energy expenditure before and after weight loss on the respective dietary patterns.

**Design** - The design was a randomised parallel design of 12 weeks weight loss (6081 kJ/day) and 4 weeks weight maintenance (7346 kJ/day) with test meals administered at weeks 0 and 16. Our main outcome measures were weight loss, fasting and post-prandial ghrelin, insulin, glucose, appetite, energy expenditure and respiratory quotient before and after weight loss. Fifty-seven overweight (BMI 33.8 ±3.5 kg/m\(^2\)) hyperinsulinaemic men (n=25) and women (n=32) were recruited. Diets and test meals were: High-protein/low-fat (HP-LF) (34% protein/29% fat) or standard-protein/high-fat (SP-HF) (18% protein/45% fat).

**Outcomes** - Weight loss (9.2 ± 0.7kg) and improvements in fasting and post-prandial insulin and glucose occurred independent of diet composition. At weeks 0 and 16, subjects desired less to eat after the HP-LF than the SP-HF meal (P = 0.02). Fasting ghrelin increased (15.5 ± 3.4 pmol/L, P <0.001) and the post-prandial ghrelin response improved (P = 0.043) with weight loss independent of diet composition. Post-prandial hunger decreased with weight loss (P = 0.018) and was predicted by changes in fasting and post-prandial ghrelin (r\(^2\) = 0.246, P = 0.004). Lean mass was the best predictor of fasting (r\(^2\)=0.182, P = 0.003) and post-prandial ghrelin (r\(^2\)=0.096, P = 0.039).

**Conclusions** - We conclude that exchanging protein for fat produced similar weight loss and improvements in metabolic parameters and ghrelin homeostasis. The reduced appetite observed with increased dietary protein appears to not be mediated by ghrelin homeostasis.