Concurrent Session 6: Glycaemic Control

The glycemic index, postprandial glycemia and the shape of the curve in healthy subjects: analysis of a database of over 1000 foods

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Background – The glycemic index (GI) of foods is based on calculation and comparison of the incremental area under the glucose curve. Its ability to differentiate between curves of different shape, the peak response, maximum fluctuation and other aspects of the glycemic response is debated.
Objective and design – A large database of 1126 foods tested by standardized GI methodology in 8-12 normal subjects was systematically analysed, comparing each food's actual and incremental blood glucose response at individual time points with its calculated GI. The secondary objective was to generate the average curve for low (≤55), medium (56-69) and high GI (≥70) foods within major food categories.
Outcomes – The calculated GI of individual foods was found to correlate strongly with the incremental and actual peak (r = 0.78 and r = 0.71 respectively), incremental and actual glucose concentration at 60 min (r = 0.66 and r = 0. 63), and the maximum amplitude of the glucose excursion (MAGE, r = 0.73), all with p < 0.001. In contrast, there was only a weak correlation between the food's GI and the 120 min glucose concentration (incremental r = 0.14, p < 0.001, absolute r = 0.14, p < 0.001). Within food groups, the mean GI, peak response, 60 min and MAGE varied significantly for foods classified as low, medium and high GI (p < 0.001).
Conclusion – This analysis supports the hypothesis the GI reliably predicts multiple attributes of the glycemic response, including the peak response and the degree of fluctuation. The overall 'shape' of postprandial glycemia is similar for foods categorized as low, medium and high GI. The notion that a low GI food has a uniquely long 'tail' or extended glucose profile is not correct. Although a slowly digested starch or sugar may represent a slow release form of energy, this does not imply that a low GI food produces a sustained glucose response.

The effects of energy restricted moderate carbohydrate dietary patterns on blood glucose and lipid profiles and cognitive and renal function in individuals with type 2 diabetes.

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Background – Low carbohydrate dietary patterns are gaining acceptance for use in type 2 diabetes.
Objective – To investigate the effect of hypocaloric high (animal) protein diets either low (Lchol) or high in dietary cholesterol (from eggs; Hchol) on plasma lipids, glycemic control, cardiovascular risk markers, cognitive and renal function in Type 2 diabetes. We hypothesized that dietary cholesterol would have no effect on low density lipoprotein cholesterol (LDL-C) and all other parameters would improve.
Design – 82 participants with type 2 diabetes (age; 54.4±8.2, BMI; 34.1±4.8 kg/m^2, microalbuminuria; 9.6±3.9mg/24hr, LDL-C; 2.67±0.10mmol/L)) were randomised to either Hchol or Lchol for 12 weeks. Both 6MJ dietary interventions contained a total carbohydrate: protein: fat ratio of 40%:30%:30%, but differed in cholesterol content; (Hchol; 590mg cholesterol, Lchol; 213mg cholesterol). A cognitive battery of tests was used at 8 weeks.
Outcomes – Overall, weight loss was 6.0±0.4kg (p<0.001). LDL-C, homocysteine, microalbuminuria (mg/24hrs) and cognitive function remained unchanged (p=0.899, p=0.369, p=0.490, p>0.05 respectively). There was a significant effect of time on total cholesterol (-0.3±0.1mmol/L; p<0.001), triacylglycerol (-0.4±0.1mmol/L; p<0.001), non high density lipoprotein cholesterol (-0.4±0.1mmol/L; p<0.001), apolipoprotein-B (-0.04±0.02gl/L; p=0.003), HbA1c (-0.6±0.1%; p<0.001), fasting blood glucose (-0.5±0.2mmol/L; p=0.005), fasting insulin (-1.7±0.7mU/L; p=0.003), systolic blood pressure (-7.6±1.7; p<0.001) and diastolic blood pressure (-4.6±1.0mmHg; p<0.001) independent of diet, gender, medication or weight loss. There was a diet x time interaction for high density lipoprotein cholesterol (HDL-C) which increased on Hchol (+0.02±0.02mmol/L) and decreased on Lchol (-0.07±0.03mmol/L; p=0.014).
Conclusion – Both high protein energy restricted diets improved glycemic and lipid profiles, blood pressure and apolipoprotein-B in individuals with type 2 diabetes. The HDL-C response to Hchol was greater than Lchol.