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Concurrent session 3: Nutrition and chronic disease

THE PREVIEW STUDY: METABOLIC OUTCOMES IN OVERWEIGHT, PREDIABETIC INDIVIDUALS AFTER AN 8-WEEK LOW CALORIE DIET

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Background/Aims: The PREVIEW intervention study (www.previewstudy.com) is the largest study aiming to prevent T2D among pre-diabetic individuals with a combination of diet, exercise and behaviour modification. Prior to weight mainten-ance, participants follow a low-calorie diet (LCD).
Methods: Participants received LCD (810 kcal daily) for 8 weeks (Cambridge Weight Plan®). Those who achieved 8% WL were analysed. Two-sided t-tests and linear regression.
Results: The weight loss phase was successfully completed by 1,842 (79%) participants. At baseline, mean ± SD age was 51.6 ± 11.6 years, BMI 35.3 ± 6.5 kg/m^2, fasting plasma glucose (FPG) 6.2 ± 0.7 mmol/L, and fasting serum insulin (FSI) 13.4 ± 7.8 mU/L. Average WL was 10.6 ± 4.0 kg, with men losing 12.7 ± 4.2 kg and women 9.6±3.4 kg (gender difference, $p < 0.001$). FPG decreased by 0.57 ± 0.7 mmol/L in men, and by 0.37 ± 0.6 mmol/L in women ($p < 0.001$). FSI decreased by 5.8 ± 7.4 mU/L in men and by 3.8 ± 5.4 mU/L in women ($p < 0.001$). The linear model showed an association of the % weight loss as well as gender on FPG and FSI changes.
Conclusions: LCD intervention resulted in marked decreases in body weight, FPG and FSI among prediabetic subjects.
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THE EFFECT OF MEAL TIMING ON POSTPRANDIAL GLUCOSE AND INSULIN RESPONSE: A CROSSOVER TRIAL IN HEALTHY VOLUNTEERS

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Background/Aims: Shift workers have a higher risk of T2DM and CVD compared to non-shift workers. Dietary factors, particularly at night, may be important factors in helping to reduce disease risk. This study examined the postprandial response to an OGTT and a low GI meal eaten at night compared with the morning.
Methods: Participants fasted for 10 hours before each meal in each trial. Trial 1 participants ($n = 10$) consumed a glucose solution (75 g in 400 mL) at 8 am and 8 pm. Trial 2 participants ($n = 9$) consumed a low GI meal at 8 am, 8 pm and midnight. Blood was collected for 2 hours (finger prick) and 3 hours (intravenous) for Trial 1 and Trial 2, respectively. Changes in postprandial blood glucose and insulin were examined using iAUC and compared using the Wilcoxon-signed rank test for Trial 1 and the Friedman Test for Trial 2. A p value < 0.05 was taken as significant.
Results: Trial 1, median (IQR) glucose iAUC was significantly greater at 8 pm compared to 8 am (331.88, 166.22 mmol/L·2 hours *vs.* 181.17, 160.32 mmol/L·2 hours; $p = 0.007$). Trial 2, glucose iAUC at midnight (252.75, 84.80 mmol/L·3 hours) and 8 pm (176.25, 331.21 mmol/L·3 hours) were both greater than 8 am (27.90, 40.98 mmol/L·3 hours), $p = 0.021$ and 0.008, respectively; but not between the 8 pm and midnight ($p = 0.594$). The same findings were observed for postprandial insulin.
Conclusions: Night time eating is associated with reduced glucose tolerance and insulin sensitivity. This study demonstrates timing of food intake may be a new risk factor for CVD and diabetes in shift workers.

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RESISTANT STARCH AMELIORATES HEAT TREATED DIET-INDUCED GUT PERMEABILITY AND RENAL DYSFUNCTION IN EXPERIMENTAL DIABETES

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Background/Aims: Heat treating foods leads to the formation of advanced glycation end-products (AGEs) which contribute to chronic renal injury. Recent research implicates gut dysbiosis in the progression of diabetic nephropathy. This study investigates whether excess consumption of dietary AGEs causes gut dysbiosis, exacerbating renal injury in a type 2 diabetes mouse model.
Methods: Six week old diabetic (db/db) and non-diabetic (db/h) mice were randomised ($n = 12$/group) to receive a low AGE (LAGE, unbaked rodent chow) or a high AGE diet (HAGE, baked at 160°C for 1 hour), with or without resistant starch (RS) for 10 weeks. 24-hour urine was collected and albuminuria was measured. Intestinal permeability was assessed *in vivo* by the clearance of FITC-labelled dextran (500 mg/kg body weight). Statistical differences were assessed by one-way ANOVA.
Results: The high AGE diet exacerbated albuminuria in db/db mice (mean ± SD, db/db HAGE: 874.4 ± 154.8 *vs.* db/db LAGE: 536.2 ± 96.5 μg/24h; $p < 0.05$), and RS attenuated this AGE-induced increase (db/db HAGE: 874.4 ± 154.8 *vs.* db/db HAGE+RS: 515.5 ± 71.9 μg/24h; $p < 0.05$). db/db mice had greater gut permeability compared to db/h mice (db/db LAGE: 2.38 ± 0.32 *vs.* db/h LAGE: 1.05 ± 0.11 μg/mL; $p < 0.01$). db/db HAGE-fed mice trended towards increased gut permeability (db/db HAGE: 3.43 ± 0.43 *vs.* db/db LAGE: 2.38 ± 0.32 μg/mL; $p = 0.06$), an effect not observed in RS-fed db/db mice.
Conclusions: Heat-treated diets led to increased intestinal permeability and worsening albuminuria in db/db mice. RS was protective against high AGE-induced albuminuria in db/db mice. These preliminary studies support the notion that dietary AGEs contribute to renal disease via alterations in gut homeostasis.
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EFFECT OF DIETARY PREBIOTIC SUPPLEMENTATION ON METABOLIC BIOMARKERS IN ADULTS WITH PREDIABETES – A CROSSOVER RCT

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Background/Aims: Modulation of the human colonic microbiota by the dietary consumption of prebiotics has been shown to confer a number of metabolic health benefits to the host, and may reduce risk factors for type 2 diabetes in susceptible individuals. A double-blind randomised placebo-controlled trial was designed to determine the effect of 12 week consumption of a prebiotic dietary supplement on serum lipids, insulin sensitivity and chronic low-grade inflammation in adults with pre-diabetes.
Methods: Twenty-seven adults with pre-diabetes (Impaired Glucose Tolerance or Impaired Fasting Glucose) aged between 40-60 years were randomly assigned to receive either 10 grams of prebiotic supplement (inulin-enriched oligofructose) or 10 grams placebo (maltodextrin) daily for 12 weeks. After a 2-week washout period, study subjects crossed over to receive the alternative dietary treatment for 12 weeks.
Results: Intention-to-treat analyses using paired samples t-tests indicated a statistically significant difference in serum HDL cholesterol (+0.07 mmol/L; $p < 0.05$) and waist circumference (-1.1 cm; $p < 0.05$) following prebiotic supplementation. There were no significant differences between prebiotic