Conference Program

9.00–9.10  Māori opening & welcome

9.10–9.30  Conference opening
Associate Professor Sheila Skeaff

9.30–10.30  Career session
Andrea Grant
Dr Rachel Brown & Dr Claire Smith
Dr Clinton Golding

10.30–11.00  Morning tea

11.00–12.30  Student & early career presentations

Andrew Reynolds:  The effect on day-long glycaemia of consuming lower and higher glycaemic index diets in people with type 2 diabetes: A randomised crossover study

Jo Slater:  Low energy availability amongst New Zealand athletes (LEANZ) study: Proposed methods

Lisa Daniels:  Vitamin D status and performance in semi-professional male rugby union players: A cross-sectional analysis

Zheng Feei Ma:  A randomised controlled trial of thyroglobulin as a biomarker of iodine deficiency: Study update

Josephine Greer:  Exploring attitudes with Q methodology in a dietetic setting

Nick McIntosh:  Eleven week beta-Hydroxy beta-Methylbutyrate supplementation: Effects on body composition and exercise performance in trained athletes

Kavitha Menon:  Supplement intake among pregnant tribal Indian women from Ramtek, Nagpur, Maharashtra
12.30–1.30 Lunch

1.30–2.45 Student & early career presentations

Michelle Jospe: Training individuals to recognise hunger through blood glucose testing: Methods of a pilot study

Melyssa Roy: The SWIFT Trial: Support strategies with Whole-food Diets, Intermittent Fasting and Training: Study Protocol for a Randomised Controlled Trial

Meredith Peddie: Activity breaks and physical activity (ABPA) study methodology: Investigating the effects of breaking sedentary behavior on postprandial metabolism

Victoria Farmer: Ethnicity and sex as determinants of activity in school and home time

Marta Silvestre: PREVIEW:NZ - Prevention of Diabetes through lifestyle intervention in NZ and around the world

Devonia Kruimer: Hepatic metabolism of sugars

2.45–3.30 Keynote speaker
Professor Jim Mann

3.30–4.00 Afternoon tea
Networking with the Human Nutrition, University of Otago staff

4.00–4.30 Presentation of prizes & wrap-up
Professor Harlene Hayne (Vice-Chancellor of the University of Otago)

4:30 + Informal social gathering
Conference Details

Organising Committee
Dr Sonya Cameron (Chair)
Dr Jill Haszard
Michelle Jospe
Devonia Kruimer
Dr Meredith Peddie
Dr Claire Smith
All at the University of Otago

Conference Funding
The Heart Foundation of New Zealand
Continuing Education Fund, University of Otago
Guest Speakers

Keynote
Professor Jim Mann
Dept Human Nutrition

Andrea Grant
Canterbury DHB

Dr Rachel Brown
Dept Human Nutrition

Dr Claire Smith
Dept Human Nutrition

Clinton Golding
Higher Education Development Centre
The effect on day-long glycaemia of consuming lower and higher glycaemic index diets in people with type 2 diabetes: A randomised crossover study

AN Reynolds, H Tekinkaya, BJ Venn

Department of Human Nutrition, University of Otago; Auckland University

Objective: Treatment of type 2 diabetes includes pharmacologic and lifestyle modification such as dietary change. The use of the glycaemic index (GI) to guide food choice has been advocated, although the effectiveness of this dietary strategy in people with type 2 diabetes has had mixed success. Our objective was to investigate day-long glycaemic responses to diets differing in GI using continuous glucose monitoring in people with type 2 diabetes.

Methods: A randomised crossover trial in 22 adults aged 18 to 75 y diagnosed with type 2 diabetes and without major co-morbidities. Lower and higher GI diets were consumed over a five-day period with food supplied to participants. Diet and physical activity were standardised and medication was maintained for the study period. Main outcomes using a continuous glucose monitoring system (CGMS) were mean 24-h glucose, three-hour incremental postprandial glycaemia (iAUC), total day-long glycaemia (AUC), and 48-h glycaemic variability assessed as mean amplitude of glycaemic excursion (MAGE).

Results: The between-treatment difference in GI was 13 GI units (P<0.01). Between low- and high-GI diets, no difference in three-hour iAUC (mmol/L·min) following breakfast (367 vs 390, P=0.69), lunch (252 vs 317, P=0.16) or dinner (216 vs 263, P=0.32) was observed. No difference in mean 24-h glucose (6.62 vs. 6.31 mmol/L, P=0.31), total day-long glycaemia (8,906 vs 8,786 mmol/L·min, P=0.82) or MAGE (3.7 vs 3.9 mmol/L, P=0.61) were observed between the low- and high-GI diet interventions, respectively.

Conclusions: Differences in dietary GI were not predictive of day-long glycaemia in people with type 2 diabetes. This may be related to difficulties in translating laboratory-generated GI values tested in individual foods to free-living settings in which foods are combined and normal activity following meals is undertaken.
Low Energy Availability amongst New Zealand Athletes (LEANZ) study: Proposed methods

Jo Slater, Katherine Black, Rebecca Cooke, Rachel Brown

Department of Human Nutrition, University of Otago

Background: Energy availability is defined as dietary energy intake minus exercise energy expenditure. Low energy availability (LEA) occurs when there is insufficient energy for normal physiological functions following exercise. LEA is thought to be common among athletes and can have serious, adverse health implications particularly on reproductive function, hormonal balance and bone health. The prevalence in New Zealand athletes remains unknown.

Aim: To estimate the prevalence of LEA amongst New Zealand (NZ) athletes.

Methods: Male and female athletes throughout New Zealand will be recruited. A sample size of 256 will be required to detect a hypothesised prevalence of 20%. Finger prick blood samples will be used to assess total cholesterol, high-density lipoproteins (HDL), triglycerides, ionised calcium, haematocrit, haemoglobin, sodium, potassium, chloride and glucose. Saliva samples will be used to assess testosterone, cortisol and progesterone. Urinary ketones will be measured through analysis of urine samples. Skinfold measurements and bioelectric impedance analysis (BIA) will be undertaken to assess percent body fat and percent fat-free mass. Participants will also be asked to complete an online questionnaire comprising of questions from validated eating disorder and LEA questionnaires. This questionnaire will be piloted on recreational NZ athletes. Energy intake and dietary patterns will be assessed via 3 day diet records recorded onto Diet Apps with supporting photographs.

Outcomes: This study should provide important information on the prevalence and predictors of LEA which should help with early detection so that treatment can be implemented before health and performance is severely compromised.
Vitamin D Status and Performance in Semi-Professional Male Rugby Union Players: A Cross-Sectional Analysis

Lisa Daniels¹, Tracy L Perry¹, Jillian J Haszard¹, C Murray Skeaff¹, Ingrid JM Ceelen², Kirsty A Fairbairn¹

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²HAN Sports and Exercise Department, University of Applied Sciences of Arnhem and Nijmegen, The Netherlands

Background: Low vitamin D status is common amongst the athletic population internationally. Sufficient vitamin D is important for bone health and recent research also suggests an importance for physical performance, with associations found between serum 25-hydroxyvitamin D (25(OH)D) concentrations and muscle strength and physical performance in healthy populations. However, these associations have not been assessed in New Zealand athletes.

Objectives: The objectives were to 1) evaluate the vitamin D status of semi-professional male Rugby Union players during pre-season training in southern New Zealand; 2) examine whether significant associations between serum 25(OH)D concentrations and athletic performance exist; and 3) to identify potential predictors of serum 25(OH)D concentrations.

Design: Cross-sectional secondary data analysis of a randomised, placebo-controlled, double-blinded intervention study. Fifty-seven semi-professional male rugby union players residing in Otago and Southland, New Zealand (latitude: 45-47° S) consented to take part in this study during the pre-season training period (early autumn). Data collected included demographic information, sun exposure habits, serum 25(OH)D concentrations and standardized New Zealand Rugby Union performance test results.

Outcomes: The mean serum 25(OH)D concentration was 94 nmol/L (range, 57-131 nmol/L). No significant associations were found between serum 25(OH)D concentrations and athletic performance measures after adjusting for body mass and training group. Ethnicity was the only significant predictor of serum 25(OH)D concentrations; with a mean concentration of 28.3 nmol/L (95% CI, -43.2, -13.5, p <0.01) lower in those of Pacific compared with New Zealand European ethnicity.

Conclusion: This group of semi-professional male rugby union players were vitamin D replete in early autumn, based on the current New Zealand Ministry of Health guideline (25(OH)D concentrations >50 nmol/L). The results suggest that serum vitamin D concentrations are not significantly related to athletic performance in vitamin D replete semi-professional male Rugby Union players during the pre-season training period. Pacific ethnicity was a significant predictor of serum 25(OH)D concentrations in our study population.
A randomised controlled trial of thyroglobulin as a biomarker of iodine deficiency: Study update

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²Department of Medicine, University of Otago, Dunedin, NZ.

Background: Iodine is required by the thyroid gland to produce thyroid hormones needed for normal growth and development. Thyroglobulin (Tg), a precursor of thyroid hormone, shows promise as a biomarker to assess iodine status; Tg increases in iodine deficiency. Studies in children have found that a median Tg <13µg/L indicates adequate iodine status. However, there is limited information whether this cut-off is useful in assessing iodine status in adults.

Objective: To determine if Tg can be used to assess iodine status in mildly iodine deficient non-pregnant adults (18-40 years old).

Design: Adults living in Dunedin, New Zealand were recruited from the University of Otago. Inclusion criteria were: consume ≤2 serving of bread products/day, urinary iodine concentration (UIC) <100 µg/L, and negative for thyroid antibodies. Participants were block randomised to receive supplements that contained either 0 (placebo) or 150µg iodine daily for 24 weeks. At screening and completion, participants were asked to provide five casual urine samples and a blood sample as well as complete an online food frequency questionnaire. During the intervention, a blood sample was provided every two months.

Outcomes: To date, 109 participants have been enrolled in the study; 59% were New Zealand European, 7% were Maori and 34% identified as other ethnicities. The median UIC (MUIC) at baseline was 64µg/L confirming that the participants were mildly iodine deficient (i.e. MUIC of 50-100µg/L). The mean (± SD) age was 23.6 (3.5) years, 23% were males, and mean (± SD) BMI was 24 (4) kg/m².

Conclusion: In this trial, iodine supplementation is expected to improve iodine status (i.e. MUIC ≥100µg/L) and be associated with a concomitant decrease in Tg, when compared to the placebo group. We will explore whether the Tg <13µg/L cut-off used to categorise iodine deficiency in children is suitable for adults.
Exploring Attitudes with Q Methodology in a Dietetic Setting

Josephine Greer, Heather Spence, Miranda Mirosa

Department of Human Nutrition, University of Otago

Background: There is a huge pool of literature on local food and its benefits to local communities. The local food network in Dunedin is actively working to connect local growers and producers with customers. In a university foodservice setting the literature concentrates on the logistics and how to facilitate local purchasing (1) but understanding stakeholder attitudes for local food is the first step. Researchers should work with foodservice institutions when evaluating guidelines for health and sustainability (2) such as incorporating local food onto the menu to see what initiatives are socially acceptable.

Objective(s): My research question is “What might be done to localise a foodservice?” Students, kitchen staff, management and suppliers will all be included to find out how they see the issue of local food within the context of a foodservice.

Design: Q methodology is becoming a more popular methodology to measure subjective opinion. It can be seen to be an intermediate between qualitative and quantitative research. Participant will be asked to sort a set of statements about local food from their standpoint (3). Cards are sorted from agree to disagree in a forced normal distribution. Factor analysis give statistical information about the range of attitudes participants have in our population (4). When forced to sort statements the participant applies their own meaning to them and a deeper level of reasoning is achieved. It can be used to assess what changes at a practical level are acceptable to participants (5).

Conclusion: We wish to find out what is an acceptable definition of local and what are acceptable initiatives that a foodservice could implement.
Eleven week beta-Hydroxy beta-Methylbutyrate supplementation: Effects on body composition and exercise performance in trained athletes

Nick McIntosh, Katherine Black\textsuperscript{1}, Hamish Osborne\textsuperscript{2}

\textsuperscript{1}Department of Human Nutrition, University of Otago, Dunedin, NZ
\textsuperscript{2}Department of Medicine, University of Otago, Dunedin, NZ

Background: Originally used to bulk cattle stocks, interest in the leucine metabolite, beta-hydroxy beta-methylbutyrate (HMB), has been growing following a clinical trial which demonstrated significant improvements in strength and body composition in humans. Subsequent trials reaffirmed that previously untrained individuals benefitted from supplementation however, trials involving athletes have demonstrated mixed results. Reviews have suggested that supplementation may be effective with longer supplementation periods, thus this study aimed to determine whether HMB supplementation had a true effect for athletes.

Design: 27 male rugby union players were randomly assigned to consume either 3g Ca-HMB or placebo (cornflour) per day in a double-blinded fashion and were followed for 11 weeks. Body composition (body weight and skinfold thickness) and exercise performance (1-5RM bench press, squat, clean, weighted pull up and a shuttle test) were measured at baseline and week 11. Participants followed a strength training programme with weekly volume increments. Additionally, participants completed a three day weighed food record and diet questionnaire during weeks one and nine.

Outcomes: Body weight increased in HMB group (99.5 to 100.1 ± 2.6kg) but decreased in placebo (99.4 to 98.0 ± 2.0kg) (p<0.05). Aerobic fitness decreased in the HMB group (1800 to 1720 ± 119m) and increased in placebo (1745 to 1905 ± 111m) (p<0.005). The HMB group had greater increases across all four strength tests and the placebo group had a greater skinfold reduction however, none of these results were significant.

Conclusion: The weight increase found in this study is consistent with other long term (>6 week) HMB supplementation studies. Larger sample sizes are required to determine whether the strength increases are worthwhile. This study suggests that HMB should be considered by athletes for preventing losses in mass that typically occur during competition phase.
Supplement intake among pregnant tribal Indian women from Ramtek, Nagpur, Maharashtra

Kavitha C. Menon¹, Elaine L. Ferguson², Christine D. Thomson¹, Karl Bailey¹, Andrew R. Gray³, Sanjay Zodpey⁴, Abhay Saraf⁵, Prabir Kumar Das⁶, Sheila A. Skeaff¹

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Background: Indian pregnant women obtained free iron-folate supplements as a part of the national programme to control anaemia. However, the empirical evidence indicated that the pregnant women from Ramtek received more than one type of supplements.

Objective: The aim of the study was to investigate any supplement use in pregnant tribal Indian women from Ramtek, Nagpur, Maharashtra, India.

Design: A longitudinal observational study of pregnant tribal Indian women (n=225) living in the villages of three tribal primary health centres (PHC) of Ramtek block. All healthy pregnant women between 13-22 weeks gestation and who met inclusion criteria were purposively recruited to the study (i.e. first visit); and were followed up at 32-36 weeks gestation (i.e. second visit). Information on any supplement use, source and types of supplements, and frequency of use in the preceding month at both visits; and supplement use in the previous day was obtained. Nutrient intakes from supplements were extracted and average intake per day was estimated.

Outcomes: The use of any supplement among pregnant women was 81% and 83% at the first and second visits, respectively. Almost three-quarters of the pregnant women used government supplements, and about 6% at the first visit and 11% at the second visit used both government and private supplements. One third of pregnant women at the first visit and about 22% at the second visit used three or more type of supplements. Similarly, almost 15% of pregnant women at both visits used three or more iron containing supplements. The government supplements provided micronutrients such as calcium, iron, B-complex and vitamin C, however, had no zinc, copper, selenium or vitamin D.

Conclusion: The government sponsored free supplements were widely used by the pregnant tribal Indian women. The use of supplements may have improved the micronutrient intakes among these pregnant tribal Indian women.
Training individuals to recognise hunger through blood glucose testing: Methods of a pilot study

Michelle Jospe1,2, Rachel Brown1, Melyssa Roy1,2, Rachael Taylor2

1 Department of Human Nutrition, University of Otago, Dunedin, NZ
2 Department of Medicine, University of Otago, Dunedin, NZ

Background: The ability to eat appropriately to hunger and satiety cues is considered a crucial component of effective weight management. However in practice, we eat for a variety of complex and interrelated reasons other than hunger. A single study has tested a type of hunger training, where participants are trained to identify and associate physiological hunger with blood glucose, and only permitted to eat when their blood glucose is ≤ 4.7 mmol/L.

Objective: To determine whether hunger training with blood glucose is a feasible intervention for a larger study, and whether 4.7 mmol/L is an appropriate cutoff.

Design: Over a two-week period, 30 participants will be trained to eat in response to hunger, by only eating when their blood glucose is 4.7 mmol/L or less. At the earliest feelings of hunger, they will record their sensations of hunger, measure their blood glucose using fingerprick samples, and describe their food eaten. By the end of the second week, participants should start to learn to predict blood glucose from their feelings of hunger, and adjust their food intake to be able to eat at convenient meal times.

Outcomes: The outcomes used to determine the feasibility of hunger training include a retention rate > 85% and recording blood glucose in > 80% of eating occasions. To determine whether 4.7 mmol/L is an appropriate cutoff, participants must only eat if blood glucose is ≤ 4.7 mmol/L on > 75% of eating occasions and fasting blood glucose must be ≤ 4.7 mmol/L on > 60% of mornings. We will also analyse the pairwise correlation between hunger sensations and blood glucose.

Conclusions: The results of this pilot study will determine whether hunger training will form an intervention arm of the upcoming two-year weight-loss intervention: the SWIFT (Support strategies for Whole-food diets, Intermittent Fasting, and Training) trial.
The SWIFT Trial: Support strategies with Whole-food Diets, Intermittent Fasting and Training: Study Protocol for a Randomised Controlled Trial

Melyssa Roy\textsuperscript{1,2}, Michelle Jospe\textsuperscript{1,2}, Rachel Brown\textsuperscript{1}, Hamish Osborne\textsuperscript{2}, Rachael Taylor\textsuperscript{2}

\textsuperscript{1}Department of Human Nutrition, University of Otago, Dunedin, NZ
\textsuperscript{2}Department of Medicine, University of Otago, Dunedin, NZ

Background: Obesity affects two-thirds of New Zealand adults, and recent meta-analyses indicate that successful weight loss is predicted mainly by long-term adherence to dietary change. It is likely that there are a number of effective diets and exercise strategies for management of obesity. Currently, the key issue in obesity research is to identify approaches that allow people to effectively maintain their improvements in diet and exercise.

Objectives: To i) compare the effectiveness of four support strategies: brief regular support, daily weighing, electronic diet tracking, and biochemical hunger training, on weight loss, adherence, body composition, dietary intake, physical activity, biochemical markers, and psychosocial indices, and ii) to assess the effects of self-chosen diets and exercise plans on these outcomes.

Design: 250 overweight adults will be recruited for a 12-month randomized controlled trial, with 12 months follow-up. After screening, participants will choose from a Mediterranean diet, modified ‘paleo’ diet, or intermittent fasting; and an exercise regime from light walking, current guidelines, or home-based high-intensity interval training. Participants will then be randomized to a support strategy.

Outcomes: Outcome assessments will be conducted at 0, 4, 12 and 24 months. These will include weight, DXA, anthropometry, blood pressure, lipid profiles, HbA1c, hsCRP, IL6, adiponectin and ghrelin, dietary intake, physical activity and aerobic fitness. Questionnaires will assess eating behaviour, depression and anxiety, resilience and personality.

Conclusions: The SWIFT trial is a rigorous, adequately powered and pragmatic clinical trial designed to assess the effectiveness of simple interventions for management of obesity, using innovative diet and exercise approaches.
Activity Breaks and Physical Activity (ABPA) Study Methodology – Investigating the effects of breaking sedentary behavior on postprandial metabolism

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²School of Physical Education, Sport and Exercise Science, University of Otago

Background: Sedentary behavior is a risk factor for cardio-metabolic disease. The original biological mechanism used to explain this association was down-regulation of lipoprotein lipase activity. To date, breaking sedentary behavior has been found to positively influence postprandial glucose metabolism, but have little effect on triglyceride clearance, when measured over a 5 – 9 h period. It is possible that the effects on triglyceride metabolism take longer to be established.

Objective: To compare the effects of two days of the following activity patterns on postprandial metabolism: Prolonged Sitting; Physical Activity combined with Prolonged Sitting; Regular activity breaks; and Regular Activity Breaks combined with Physical Activity.

Design: Thirty-six inactive, sedentary adults will participate in a cross over study. Prolonged Sitting will involve sitting for 7 h on day one, and 5 h on day two. Physical Activity will involve sitting for 6.5 h followed by 30 min of walking on day one, and sitting for 5 h on day two. Regular Activity Breaks will involve walking for 2 min every 30 min on days one and two. Regular Activity Breaks combined with Physical Activity will involve walking for 2 min every 30 min for 6.5 h followed by 30 min of continuous walking on day one, and walking for 2 min every 30 min on day two. Postprandial response will be measured to a standarised meal fed to participants on the morning of day two.

Outcomes: Total and incremental area under the curve will be calculated for insulin, glucose, triglycerides and non-esterified fatty acids. Indirect calorimetry will be used to describe the energy expenditure associated with each intervention.

Conclusions: The results of this study will help to establish if breaking sedentary behaviour provides cardio-metabolic benefit, thus providing plausible and consistent support of observed association between sedentary behaviour and cardiovascular disease and diabetes.
Ethnicity and sex as determinants of activity in school and home time

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Background: Children spend a large amount of their time at school and there are a growing number of studies aimed at increasing children’s physical activity within the school setting. Although it is often reported that boys do more activity than girls, little is known about activity data with respect to time of day and ethnicity.

Objectives: To examine the associations between sex, ethnicity, body mass index (BMI) z-score and physical activity in a large group of primary school-aged children participating in a two-year randomised controlled trial promoting active play.

Design: Sixteen low-mid socioeconomic status primary schools were randomised to control or intervention in two regions of New Zealand to determine if redevelopment of school play environments increases physical activity and decreases excessive weight gain and bullying. The following measures were obtained: height, weight and waist circumference and physical activity for 24-hours over 9 days using ActiGraph GT3X accelerometers. Specific time periods of interest (6am-9pm, recess, lunch and outside school times) were analysed separately.

Outcomes: 840 children were measured at baseline (mean age 7.9 years (SD 1.1), 50.1% girls). 19.8% of the children were Maori, 13.7% Pacific, 8.8% Asian and the remainder (57.7%) New Zealand European and other. Marked (P < 0.001) ethnic differences in BMI z-score were apparent, ranging from 0.29 (SD 1.25) in Asian children to 1.37 (1.05) in Pacific. Mean (SD) counts per minute during the day (6am-9pm), recess, lunch and afternoon home times were 621 (158), 1162 (640), 1167 (420) and 672 (262) respectively. Boys were more active at all time periods (P = 0.02) except afternoon home time. Asian children were less active overall (P < 0.001) but not within the school environment.

Conclusion: Despite marked differences in body size, few differences in activity exist within school time and Asian children appear to be less active outside school.
PREVIEW - Prevention of Diabetes through lifestyle intervention in Europe and around the world – The New Zealand Perspective


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Background: Type-2 diabetes (T2D) affects approximately 10% of the population of New Zealand (NZ), ranked the 3rd country with higher rates of overweight and obesity. T2D is preventable through lifestyle modification. We are participating in a large scale, longterm (5 years) global program, PREVIEW: Prevention of Diabetes through Lifestyle Intervention in Europe and Around the World (New Zealand - University of Auckland and University of Otago - and Australia); recruiting two and a half thousand (2,500) overweight adults and children known to be at high risk.

Objective: PREVIEW aims to determine whether a higher protein diet with low glycaemic index (GI) is more effective for weight loss and diabetes prevention than the current international recommendations of a higher carbohydrate diet (moderate GI), and also the additional effect of moderate/higher intensity exercise.

Design: In NZ, 315 adults, overweight (BMI≥25.0 kg/m²) and prediabetic will be recruited. Participants complete an 8 wks weight loss programme using a low energy diet (LED, 4 MJ/d), and those achieving ≥8% enter the longterm weight loss maintenance program. Diets are ad libitum with instructions on how to achieve the macronutrient prescription. Intensive dietary and exercise counselling takes place in groups of 8-12 individuals. Blood (metabolic), urine (diet compliance, metabolomics) and faecal (microbiota) samples are collected, and questionnaires for objective/subjective evaluations.

Outcomes: Primary outcome is the incidence of diabetes at 3 years, based on a 75g Oral Glucose Tolerance Test (OGTT). Secondary endpoints are change in weight, % fat, insulin sensitivity, risk factors for cardiovascular disease (CVD), and changes in perceived quality of life and physical activity.

Conclusions: PREVIEW will increase knowledge of lifestyle, health and well-being, and as such contribute to the prevention of diabetes to advance health equality particularly in lower socioeconomic groups and ethnicities such as Maori and Pacific populations with high obesity rates. This is a landmark study which will inform international diabetes recommendations.
**Hepatic Metabolism of Sugars**

*D Kruimer, AG Nieuwenhuizen, KJ Teerds*

*Wageningen University and Research Centre, Department of Human and Animal Physiology, Wageningen, The Netherlands*

**Background:** The increasing prevalence of obesity in the United States shows an almost parallel trend with the increased consumption of high fructose corn syrup (HFCS), a caloric sweetener, which is high in fructose (55%) compared to sucrose (50% fructose). Due to differences in metabolism of fructose and glucose, the increase in fructose consumption has been suggested to be involved in the pathogenesis of obesity and related metabolic disorders such as non-alcoholic fatty acid liver disease (NAFLD).

**Objective:** In this study we investigated the role of dietary fructose in the hepatic storage of triglycerides and glycogen.

**Design:** We investigated the effects of consuming an isocaloric high-glucose (*n*=20), a glucose-fructose (*n*=20), or a high-fructose diet (*n*=20) for ten weeks in terms of triglyceride and glycogen storage in the livers of mice (C57Bl/6J) (Protein 20.2 E%; CHO 43.9 E%; Fat 35.9 E%). Triglycerides were measured after an enzymatic hydrolysis with lipases, where quinomeimine was coloured and its absorbance was measured. For the measurements of glycogen, we made use of a colorimetric determination with iodine and absorbance was measured as well.

**Outcomes:** The relative liver weight (mg/g tissue) in females was significantly higher in the fructose group compared to the glucose group and also significantly higher compared to the glucose-fructose. The absolute hepatic triglyceride content, in milligrams, in females, was significantly higher for the fructose group compared to the glucose group, and significantly higher for the fructose group compared to the glucose-fructose group. Furthermore, this study found that the triglyceride content (mg/g tissue) was significantly lower in the glucose-fructose group in females compared to males. The glycogen content (mg/g tissue), in males, was significantly lower in the glucose-fructose group compared to the glucose group. In females the glycogen content was significantly lower in the fructose group compared to the glucose group.

**Conclusion:** A high-fructose diet for ten weeks causes an increase in triglyceride storage, as well as a decrease in the glycogen storage in the liver in female, but not in male mice.