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P01

Dietary cinnamon improves insulin sensitivity in growing pigs

AT Hung[1] MA Sabin[2], BJ Leury[1], FR Dunshea[1]
[1] *Melbourne School of Land and Environment, The University of Melbourne, Parkville, VIC Australia* [2]*Murdoch Children's Research Institute, The University of Melbourne, Parkville, VIC Australia*

Background
The rise in obesity is a critically important health issue for the developed world. Obesity is associated with a number of health problems and involved the development of insulin resistance. Obesity is characterized by increased adipose tissue mass and is closely associated with the development of insulin resistance in peripheral tissue such as skeletal muscle. Cinnamon is the dried inner bark of various trees in the *Lauraceae* family and has been suggested to improve insulin sensitivity in diabetics.

Objective
To determine the effects of dietary cinnamon on insulin sensitivity and expression of genes involved in insulin signalling in growing pigs.

Design
The experiment involved a total of 16 female pigs fed one of two diets containing 10% fat and either 0 or 12.5 g/kg of cinnamon during the finisher phase. After 6 weeks the pigs were subject to an intravenous glucose tolerance test IVGTT). A week later the pigs were slaughtered and muscle samples obtained to determine gene expression. Carcasses were scanned by dual energy X-ray absorptiometry to determine composition. Data were analysed using Genstat 13.

Outcomes
Dietary cinnamon tended to increase daily gain (0.93 vs 1.03 kg/d, P=0.10), had no effect on feed intake (2.47 vs 2.53 kg/d, P=0.30) and reduced (improved) the feed conversion ratio (2.69 vs 2.48, P=0.05). Dietary cinnamon had no significant effect on carcass (78.9 vs 81.1 kg, P=0.16), lean tissue (53.9 vs 56.8 kg, P=0.13) or fat (6.6 vs 6.5 kg, P=0.81) weight. Dietary cinnamon increased glucose clearance after an IVGTT as indicated by reduced area under the curve (103 vs 74 mmol.min/L, P=0.019). Dietary cinnamon increased the expression of glucose transporter-4 (414%, P=0.02), c-Jun N-terminal kinase (260%, P=0.03), uncoupling protein-3 (757%, P<0.01), suppressor of cytokine signaling-3 (340%, P<0.01), serine/threonine protein kinase (370%, P=0.02) and cAMP-response element-binding protein-B (400%, P=0.01) in skeletal muscle.

Conclusion
These data confirm that dietary cinnamon can improve feed efficiency and insulin sensitivity in pigs.

Source of funding
Australian Pork Limited and Pork CRC.

P02

Estimating total body fat using computed tomography in two dog breeds

D Purushothaman[1], WY Brown[1], S-B Wu[1], BA Vanselow[2]
[1] *Animal Science,* [2] *NSW Dept of Primary Industries, University of New England, Armidale, NSW*

Background
Use of computed tomography (CT) in canine obesity research is limited and accuracy of estimated fat is still questioned. Using latest image analysis programs, previous studies in sheep showed a significant correlation between CT-derived and hot carcass measurements. Hence we tested the method in canine research.

Objective
To develop an improved research method to estimate body composition including total body fat, lean tissue and bone in two morphologically diverse breeds of dogs.

Design
A whole body scan was performed twice (four weeks apart) on six beagles and six greyhounds using Picker UltraZ 2000 CT scanner. They were sedated to the prone position with fore/hind limbs pointing forward and tails tucked in. The individual CT images were taken at 10 mm interval and edited using latest software (OSIRIX) in diacom format to remove extraneous objects within the image. Images were then converted from 16 bit CT image to 8 bit binary image using Image J and rescaled to 256 greyscales using AutoCAT. Boundaries for fat, lean and bone were set to the scales of 20–130, 131–220, and 221–255 respectively. The AutoCAT program then computed the total weight of fat, lean and bone for each dog. CT-derived total body weight was calculated from the sum of fat, lean and bone. Percentages of fat, lean and bone were also calculated. Pearson correlation analysis between CT-derived and measured total body weight were performed separately in two breeds for two scans (CT1, CT2). Significant differences of fat% between breeds were determined using paired t-test.

Outcomes
When CT-derived total body weight was compared with measured total bodyweight, both beagles and greyhounds showed a significant correlation (R^2=0.99; P=0.000) for both scans. The method also detected a significant breed difference (P=0.000) in the mean fat% for both scans.

Conclusion
The proposed method using latest image analysis software programs showed significant correlation between CT-derived and measured total body weight for both the breeds, and the results were reproducible in two scans. The body compositions of different breeds measured by the CT scan were significantly different. Future studies should compare the proposed method with other existing methods used for detecting body composition such as dual-energy X-ray absorptiometry and deuterium oxide dilution.

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Source of funding
Supported by UNE postgraduate fund.

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P03

Prediction of body composition in dogs by bioimpedance spectroscopy

LC Ward[1], L Rae[2], D Vankan[2], E Flickinger[3], J Rand[2]
[1] School of Chemical and Molecular Biosciences, [2] Centre for Companion Animal Health, [3]P&G Pet Care, The University of Queensland, Brisbane, Qld

Background
As in the human population, obesity and associated co-morbidities of the metabolic syndrome are growing problems in companion animals. Australian data indicate that approximately 34% of dogs are classed as overweight with 8% judged to be obese. The measurement of adiposity, and body composition in general, in animals presents the same challenges as in humans. While the same assessment methods are available for use in cats and dogs, many have not been validated for their use.

Objective
To predict body composition of dogs by bioimpedance spectroscopy (BIS) and to cross-validate against measurements of body composition using dual energy X-ray absorptiometry (DXA).

Design
Body composition was measured in 35 adult mixed breed dogs (18M:17F), mean body condition score 3.2 on a scale of 1-5 (range 3 - 4.3) and mean body weight 21.7 kg (12.1 – 43 kg). Whole body BIS was conducted in lightly anaesthetised animals in left lateral recumbency using an SFB7 impedance spectrometer (ImpediMed, Brisbane). Voltage sensors (Ag/AgCl, 3M Red Dot) were located at the right stifle and elbow with current drive sensors 2 cm distal; sites were shaved. Length measurement was middle of right eye to anus measured with a tape. Body composition (fat and fat-free mass, FFM) was calculated using published BIS coefficients for dogs. Reference body composition was determined by DXA (Hologic QDR-4500A). Data were cross-validated using concordance correlation and limits of agreement analysis.

Outcomes
Mean FFMs were 16.9 ± 4.3 and 17.3 ± 4.8 kg for BIS and DXA, respectively. Mean fat masses were 4.7 ± 3.1 and 3.9 ± 2.0 kg for BIS and DXA, respectively. FFM was highly correlated (r = 0.964) between the two methods; fat slightly less so (r = 0.926). Limits of agreement of BIS with DEXA were 2.2 (11%) to 2.9 kg (15%) for FFM, and -3.5 (72%) to 1.8 kg (46%) for fat.

Conclusion
The estimation of body composition by BIS in dogs is a practical alternative to methods such as DXA. Accuracy is good at a population level but the relatively wide limits of agreement, especially for fat, may limit its usefulness for body composition assessment in individual animals.

Source of funding
P&G Pet Care.

P04

Nutritional composition of kangaroo tail, canned meats and salted plums for the 2011-13 Australian Health Survey

SL Shaw, RL Sobolewski, J Baines
Food Composition, Evaluation and Modelling Section, Food Standards Australia New Zealand, Canberra, Australian Capital Territory

Background
On a 2011 field visit to remote communities in Western Australia, frozen kangaroo tail and various canned meats were observed to be popular purchases from community stores. Various store surveys in remote communities had reported other foods as commonly available for sale, such as salted plums. However, existing nutritional composition data for these foods were limited or out of date.

Objective
To analyse up-to-date nutrient information on a range of foods available for purchase in remote stores. This will support accurate reporting of food and nutrient intakes for people living in these communities from the National Aboriginal and Torres Strait Islander Nutrition and Physical Activity Survey (NATSINPAS, part of the 2011-2013 Australian Health Survey).

Design
Analyses of the moisture, protein, total fat, cholesterol, sugars, starch, dietary fibre, ash, vitamin and mineral contents and fatty acid profile, of composite samples of 10 selected foods purchased in 2012 were commissioned from the National Measurement Institute in Melbourne. These foods included a composite sample of six tails from small red kangaroo and composite samples of a range of canned meat products and imported salty plums (multiple brands, selected using store survey data).

Outcomes
Information on the nutritional composition of kangaroo tails and salty plums was collected for the first time by Food Standards Australia New Zealand (FSANZ). Kangaroo tail was found to be lean (1.1% fat), similar to previous analyses of kangaroo loin fillet and rump. Of the total fatty acids present, 1.1%, 0.7% and 0.3% were found to be Docosapentaenoic (DPA), Eicosapentaenoic (EHA) and Docosahexaenoic (DHA), respectively. Up-to-date compositional data on canned corned beef, spam, spaghetti in tomato sauce, braised steak and onions, vegetables and steak, vegetables and sausages, Irish stew, steak and kidney pie were obtained to verify and extend existing compositional data.

Conclusion
Up-to-date nutrient profiles for a range of foods supplied to stores and observed to be commonly consumed in remote communities are available for use in the 2012-13 NATSINPAS and in future FSANZ publications such as NUTTAB.

Source of funding

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Australian Bureau of Statistics

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P05

Categorisation of non-core foods and drinks consumed by a clinical sample in an intervention trial

SJ Grafenauer[1], EJ Beck[1], LC Tapsell[1], MJ Batterham[2]
[1] Smart Foods Centre, School of Health Science, University of Wollongong, [2] Mathematics & Applied Statistics, University of Wollongong, Wollongong, NSW

Background
Non-core foods are discouraged in favour of core foods in dietary guidelines. Australian data indicates that consumption of non-core foods and drinks, or 'extra' foods, exceeds 20% of energy, the recommended limit for the healthy population. While energy-dense, nutrient poor choices are associated with excessive energy intake and weight, we found that trial participants who reported consuming greater amounts of non-core foods and drinks at baseline, lost more weight at 3 months than those consuming foods closer to guideline recommended foods. However, more detail about the types of non-core foods is required to give effective dietary advice.

Objective
The aim of this study was to categorise non-core foods and drinks from reported food consumption patterns of participants in a clinical weight loss trial.

Design
All baseline and 3 month diet history data from participants in two clinical trials (n=231) was first categorised into food groups referencing core foods (fruit, vegetables, cereal foods, lean meat or equivalent, low fat dairy foods) and non-core foods. A further 29 categories were created from the non-core group with reference to published research.

Outcomes
At baseline non-core foods and drinks contributed 29% of dietary energy. The median value (2096kJ/day) equated to 3.5 serves/day. At baseline, snack foods (biscuits, chocolate, fried potato chips, cake, ice cream, crisps and lollies), takeaway meals and drinks (soft drink and cordial) were amongst the top ten contributors of energy. Biscuits (sweet and savoury), take away meals, cake and chocolate remained after 3 months of dietary counselling, although the median intake value dropped to 573kJ, equivalent to <1 serve.

Conclusion
In this research context, non-core foods and drinks contributed excess energy in the study population. Targeting non-core foods and drinks may result in greater weight loss, however, this may only be possible if the specific choices of individuals are properly assessed to enable relevant guidance on alternative choices and serve sizes.

Source of funding
NHMRC and HAL sponsored clinical trials (ACTRN 12608000425392 and 1260000784011)

P06

Development of a diet quality index to assess eating patterns among Australian preschool-aged children

K Kunaratnam[1], VM Flood[1], S Mealing[1], L Baur[2], LM Wen[2]
[1]University of Wollongong, NSW, Australia, [2]University of Sydney, NSW, Australia

Background
The use of Diet Quality Indices in the dietary assessment of young children has been limited.

Objective
The aim of this study was to develop a comprehensive Diet Quality Index (DQI) for use in assessing dietary habits among Australian preschool-aged children. Adherence to key recommendations using the Australian Guide to Health Eating and dietary guidelines for children was evaluated.

Design
The DQI consists of 14 components representing diet and behavioural components essential for establishing healthy eating habits throughout life. Scores from 0 to 5 were assigned to each component of the index. The overall scoring tool ranged from 0 (minimum) to 70 (maximum), with the score for each child being determined by the level of adherence to key dietary and lifestyle recommendations. Repeatability of the tool was assessed using data from a short FFQ (sFFQ) that was completed by parents of 62 children with mean age of 3.7 (SD 0.91) years within a two week period. Preliminary analysis was assessed using Pearson's correlation coefficient and Bland-Altman method assessment.

Outcomes
Mean total DQI score in sFFQ1 =52.5 (SD 7.2) and in sFFQ2=53.6 (SD 5.6), with high correlation between DQI scores ($r=0.822$, $p<0.0005$). 59/62 (95%) of data points lie within 2SD of the mean difference on the Bland-Altman plot of the data. The DQI showed good reliability for all scoring tool components i.e. no significant differences for each individual component

Conclusion
The DQI is valuable in determining dietary patterns of preschool-aged children and has good reliability. However, its validity remains to be established and may strengthen the use of this tool in discerning meaningful health outcomes.

Source of funding
This research is related to the work of the Healthy Beginnings Trial (HBT) funded by the Australian National Health and Medical Research Council (ID number: 393112), however the participants of this study were not part of the HBT.

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P07

Back to basics – modern approaches to food composition through digital food photography

A McMahon[1], K Walton[2], C Brewer[3], M Fitzpatrick,[4] C Lawson[5].
[1] University of Wollongong, Wollongong, NSW, Australia

Background
Substantive knowledge about food composition is fundamental for nutritionists to effectively evaluate dietary patterns and advise on appropriate food choices. Digital food photography offers a novel way to embed basic food knowledge concepts and aligns with modern learning techniques.

Objective
The primary aim was to investigate the effectiveness of a digital food photograph resource in developing nutrition students' food composition knowledge and skills. The secondary aim was to identify opportunities for additional use in practice and explore opportunities for further development.

Design
One-hundred and sixty high quality digital food photographs have been developed. Each food item's digital photograph was produced with, and without nutrient composition data. The resource was piloted and tested initially with over 240 nutrition students. Nutrient composition data (energy, fat, salt, sugar, fibre) were chosen to illustrate key quality principles emphasized in the dietary guidelines. Several cohorts of students were able to access the resource through their eLearning website for either an assessment related task, individual learning opportunity or for use as an education tool. An anonymous online survey was made available for each cohort to comment on the quality and usefulness of the tool and each cohort was invited to take part in semi-structured focus groups to explore their perspectives.

Outcomes: The findings identified students found the resource useful in supporting interactive learning and contributing to their knowledge, *"I loved it. I absolutely loved it. Like I sat on it for hours going through it"* (S1). Most identified they would utilise the resource again for their own learning and as an education tool. From initial feedback a further 180 photographs have been been developed and future commercial applications are being investigated.

Conclusion
Digital food photographs provide a simple and effective learning tool to embed basic food composition knowledge with nutrition students and offer opportunities to enhance education in the broader community.

Source of funding
University of Wollongong Faculty based Learning and Teaching Grant

P08

Due diligence in research - *Salmonella Adelaide*, an unexpected finding in a 1977 study of partial thiamin restriction

B Wood
Public Health Nutritionist, Carlton, VIC ,Australia

Background
The identification of *Salmonella Adelaide* was an unexpected finding in a complex double blind partial thiamin restriction study of human volunteers in 1977. It was discovered through a last minute due diligence microbiological check on calcium caseinate milk powder, which was to be part of the daily diet of 19 subjects over several weeks.

Objective
The inducement of early thiamin (Vitamin B-1) depletion and subclinical thiamin deficiency, and the provision of improved criteria for the assessment of thiamin status in Australia.

Design
The thiamin level in the diet (0.5 mg thiamin total per day) was below the physiological thiamin requirement and the recommended daily dietary thiamin intake.

Outcomes
Unknown to the research team at the time, there were already many stakeholders concerned about the safety of commercial production and distribution of milk powders in Victoria. Early in the research, the unexpected finding of *Salmonella Adelaide* in the powder led to urgent investigation of any harmful effects on the volunteer subjects in the study (there were none) and revision of the thiamin research protocol, together with consideration of the effect of external factors on the study such as the public health and the media implications. A missing information link was contributed to the statewide investigation of the origins of milk powder contamination in a number of Dairy Plants in Victoria by the Microbiological Diagnostic Unit at the University of Melbourne. Subsequently, the Victorian milk processing industry was overhauled.

Conclusion
The partial thiamin restriction study was successful and achieved its aim. Duty of care and due diligence in research are very important, and in this case an unexpected finding also made a significant contribution to food safety, public health, and the Victorian milk industry.

Source of Funding
National Health and Medical Research Council.

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P09

A 12 month longitudinal study of selenium status in older Tasmanian adults

JM Beckett, MJ Ball
School of Human Life Sciences, University of Tasmania, Launceston, Tasmania

Background
Selenium is known to be important in many areas of health, including the immune system and in antioxidant function. Suboptimal selenium status in the elderly appears common, and this may be particularly important as immune function decreases and risk of chronic and other disease increases. Few medium-term longitudinal studies of selenium status have been reported.

Objective
To determine the magnitude of variation in selenium status over 12 months in older adults, in a population which many have marginal selenium status.

Design
A 12 month longitudinal, observational study of selenium status was conducted in older Tasmanians. Twenty three men and 57 women (mean age 69.6 yrs) were studied repeatedly at 3 month intervals over 12 months; selenium status was assessed by measuring dietary intake using a semi-quantitative food frequency questionnaire and serum selenium concentration using graphite furnace atomic absorption spectroscopy.

Outcomes
At baseline, men consumed 80.6 µg, and women 62.9 µg selenium per day, respectively; there was however no significant difference in serum selenium (1.11 *v.* 1.09 µmol/l; P=0.58). Overall, 50 participants (62.5%) had baseline serum selenium below 1.14 µmol/l, a level considered to represent the physiological requirement of selenium. Repeated measures nonlinear regression analysis revealed the mean magnitude of variation over 12 months was small and non-significant (0.02 µmol/l; 95% CI -0.01 to 0.05; P=0.17). Only dietary intake after 9 months and serum selenium after 12 months were significantly different to other time points when compared using repeated measures linear regression. While overall there was minimal variation observed, subjects in the upper quartile of selenium status at baseline appeared to experience greater variation in selenium status over the study period.

Conclusion
In this cohort of older adults, selenium status did not vary significantly over 12 months and there was no evidence of a seasonal pattern.

Source of funding
Supported by the Clifford Craig Medical Research Trust, Launceston, Tasmania

P10

What's on the menu for the 75+ Health Assessment?: An opportunity for nutrition screening of older patients in General Practice

AH Hamirudin[1], KE Charlton[1], KL Walton[1], A Bonney[1, 3], J Potter[2], M Milosavljevic[2], G Albert[3], A Hodgkins[3], A Dalley[3]
[1] University of Wollongong, [2] Illawarra Shoalhaven Local Health District, [3] Illawarra and Southern Practice Research Network, NSW

Background
Nutrition screening to identify older patients at risk of malnutrition is not routinely conducted in General Practice despite evidence that early intervention improves clinical outcomes and patient quality of life.

Objective
To determine practices of General Practitioners and practice nurses regarding identification of risk of malnutrition in older adults.

Design
An exploratory, qualitative study was undertaken with doctors and nurses from three General Practices of the Illawarra and Southern Practice Research Network, NSW. Twenty five in-depth individual interviews were conducted (n=10 General Practitioners, n=5 General Practice Registrars, n=10 practice nurses). Interviews were audio-recorded, transcribed verbatim and analysed thematically using qualitative analysis software, QSR NVivo v.9.

Outcomes
No participants used validated nutrition screening instruments to identify nutritional risk in older patients. Currently, nutritional risk is informally assessed using a variety of sources of information, including: diet intake, food preparation, medical evaluation, social background, anthropometric measurement, financial status, patients' attitude, mobility status, psychology, family involvement and food access. The primary identified barrier related to time constraints, but opportunities were identified within the existing 75+ Health Assessment.

Conclusion
Practitioners identified the Medicare-funded 75+ Health Assessment to be the most acceptable way in which to routinely incorporate nutrition screening for older adults. The item would need to be adapted to include relevant questions and associated training implemented.

Source of funding
2011 Illawarra Health and Medical Research Institute (IHMRI) Clinical Grant.

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P11

Meeting the nutritional needs of elderly residents in aged care: Are we doing enough?

S Iuliano[1], A Olden[2], J Woods[2]
[1] Department of Endocrinology, [2] Department of Nutrition and Dietetics, Monash University, [1]University of Melbourne / Austin Health, West Heidelberg, VIC

Background
Institutionalized elderly are at high risk of malnutrition, including those residing in low-level aged-care and able to self-feed.

Objective
We used comprehensive dietary intake assessments to determine the nutritional adequacy of food served to residents and if food waste contributed to insufficient nutrient intakes.

Design
This cross sectional study involved 199 residents (mean age 86.7 yrs, 76% females) from 18 low-level aged care facilities in Melbourne, Australia. Dietary data using 3-6 day weighed food records. Foods were categorised into main food groups (grains, fruit, vegetables, meats, dairy and 'extra') and quantified based on recommended serving sizes. Chi squared tests were used to determine sex differences in the proportion of residents below recommended intake levels.

Outcomes
Residents were provided with sufficient serves of fruit (> 2) and meats (> 1), but not dairy (< 3), vegetables (< 5) and grain foods (women only, < 4), and excess serves of 'extra' foods (> 2). Mean dietary intakes did not meet recommendations for calcium, zinc, magnesium, potassium, folate and dietary fibre with many residents not meeting energy and protein requirements. Sodium intake was 4-5 times higher than recommended, and sugars consumed in excess. Food waste resulted in men not consuming recommended serves of grain foods and contributed to mean intakes of women not achieving recommended levels for iron and phosphorus. 'Extra' foods contributed substantially to energy intake but provided few of the required nutrients.

Conclusion
Substituting some 'extra' foods for serves of dairy, vegetables and wholegrain foods would improve the nutritional quality of foods, without altering food volume, so is feasible to improve nutritional status in elderly aged-care residents.

Source of funding
Dairy Australia

P12

Vitamin D receptor polymorphism FokI and body mass index in an elderly population

C Martin[1], M Lucock [1], Z Yates [1], S Tang[1], P Roach[1], M Veysey[2]
[1]Nutrition, Food and Health Research Group, University of Newcastle, [2] Teaching & Research Unit, Northern Sydney Central Coast Health, Gosford, NSW, Australia

Background
Vitamin D related gene variants may be associated with body mass index (BMI).

Objective
To examine whether the vitamin D receptor (VDR) single nucleotide polymorphism (SNP) FokI is associated with BMI in a retirement village population. As a major component of energy balance, BMI is an important element and risk factor linked with many degenerative disorders.

Design
227 randomly selected subjects over 65 yrs were recruited from two retirement villages. Participants attended four clinics, providing anthropometric measurements including height and weight for BMI, and blood samples. Dietary intake was assessed by food frequency questionnaire. Genotype analysis was performed using polymerase chain reaction and restriction fragment length polymorphism analysis. Genotypes were assessed following gel electrophoresis.

Outcomes
Results showed that the VDR FokI to be significantly associated with BMI ($P<0.01$). A separate statistical analysis separating participants by gender found that only females were significantly associated with BMI ($P<0.01$). No association was found with dietary vitamin D intake, BMI and VDR FokI.

Conclusion
A significant association was found between BMI and the VDR FokI SNP in this elderly cohort. The VDR gene has been previously studied in relation to bone mass density, due to the role of vitamin D in bone metabolism. Studies have suggested that the VDR may also be involved in other tissues that respond to vitamin D, and that insulin and adipocyte differentiation and metabolism may be important related phenomena, as VDR is expressed in preadipocytes. Given the involvement of the VDR in metabolic homeostasis and insulin-related mechanisms, it is possible that polymorphisms of the VDR are related to components of BMI that are influenced by energy balance. Future studies will further reveal the molecular mechanisms behind the genotype/phenotype associations observed for SNPs in the VDR gene.

Source of funding
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P13

Impact of mandatory iodine fortification of bread to total intake: results from FSANZ's 2010 post fortification bread survey

J Dugbaza, J Cunningham, J Baines
Food Composition, Evaluation and Modelling Section, Food Standards Australia New Zealand, Canberra, Australian Capital Territory

Background
To improve the population's intake of dietary iodine, mandatory use of iodised salt in making bread came into effect in Australia in October 2009.

Objective
To determine the amount of iodine in Australian breads, and the resultant impact on dietary iodine intakes within the population.

Design
A total of 100 samples of wheat-flour based breads from seven bread categories, including white, wholemeal and mixed grain breads, were purchased from representative food retail outlets in the capital cities of all Australian states and territories in 2010. The samples were analysed by the National Measurement Institute. Iodine levels were measured using inductively coupled plasma-mass spectrometry (ICP-MS).

Outcomes
The estimated mean iodine intake for the target populations increased after fortification. In children aged 2-3 years it increased from 127 mcg/day to 165 mcg/day and for women aged 16-44 years from 98 mcg/day to 150 mcg/day. Following the use of iodised salt in making breads, the contribution of cereal/cereal products to total dietary iodine intake increased. The percentage contribution increased from <5% to 25% for children aged 2-3 years and from 6% to 37% for women aged 16-44 years. The post-fortification contribution from milk, milk products/dishes was reduced as a consequence from 70% to 53% for 2-3 year olds and from 41% to 26% for women 16-44 years. The proportion of 2-3 years olds estimated to have inadequate intakes of dietary iodine decreased from 9% to <1% after fortification. Similarly, the proportion of women aged 16-44 years estimated to have inadequate iodine intakes decreased from 57% to 8% (compared to non-pregnant Estimated Average Requirement , EAR) and from 96% to 63% (using EAR for pregnancy).

Conclusion
The use of iodised salt by both small-scale and large-scale bread manufacturers for the production of bread appears to have resulted in an increase in estimated iodine intakes for the target groups and the all other sub-groups of the Australian population. FSANZ is undertaking a follow up bread monitoring survey in 2012.

Source of funding
Not applicable.

P14

Olive pomace and wastewater as sources of phenolic compounds after commercial olive oil production using a traditional press

CD Goldsmith[1], CE Stathopoulos[1], JB Golding[1,2] , PD Roach[1]
[1]*University of Newcastle and* [2]*NSW Department of Primary Industries, Ourimbah, NSW 2258*

Background
Olives are known to be a very good source of health promoting phenolic compounds, including oleuropein, but only small amounts end up in olive oil after pressing. Some remain with the olive wastes (pomace and wastewater) and add to environmental problems posed by the disposal of this material. Olive wastes may be a good source for the extraction of the health promoting phenolic compounds.

Objective
To gain a deeper insight into the partitioning behaviour of olive phenolic compounds during a traditional olive oil processing method and determine if the waste products (pomace and wastewater) are good sources of the phenolic compounds, including oleuropein.

Design
Olives of the Frantoio cultivar were pressed using an Enrossi traditional press. Samples of whole olives, pomace, wastewater and oil were taken from triplicate runs in order to compare their total phenolic compounds (Folin & Ciocalteu assay), oleuropein (HPLC analysis) and their antioxidant activity (DPPH assay). The results were expressed as means±SD of gallic acid equivalents (GAE), oleuropein (μmol) or trolox equivalents (TE), respectively, per gram dry weight (dw).

Outcomes
The total phenolic compounds, oleuropein and antioxidant activity were found to have decreased significantly ($p<0.001$) from whole olives (18.5±0.6 GAE/g, 3.5±0.68 μmol/g and 29.5±1.4 TE/g) to pomace (4.9±0.4 GAE/g, 0.7±0.2 μmol/g and 9.7±0.4 TE/g) but still represented 26%, 21% and 32% of whole olive phenolic compounds, oleuropein and antioxidant activity, respectively. When expressed based on dry solids, wastewater (63.8±27 mg GAE/g, 12.2±3.3 μmol/g and 80.4±37.3 TE/g) exhibited twice, the same and twice the phenolic compounds, oleuropein and antioxidant activity, respectively, compared to the whole olives. Antioxidant activity was also highly correlated ($p<0.001$) with total phenolic compounds ($R^2=0.995$) and oleuropein ($R^2=0.971$) across all samples.

Conclusion
Substantial amounts of phenolic compounds and oleuropein partitioned into the pomace. Although dilute, the wastewater also contained significant amounts of these compounds. Therefore, pomace and wastewater may be good sources of olive phenolic compounds, including oleuropein.

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Source of funding
NSW Department of Primary Industries (DPI).

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P15

Food Sensations®: Empowering vulnerable families with the knowledge to make healthy food choices

P Pannu[1], C Davies[1, 2, 3], R Milligan[1]
[1] Foodbank WA, [2] The University of Western Australia, [3] The University of Notre Dame Australia, Perth, Western Australia

Background
The aim of the Foodbank WA *Food Sensations*® Food Literacy and Skill Development Program is to enable WA adults/families improve their ability to make appropriate eating decisions for good health and to increase the prevalence of healthy eating amongst WA adults/families living in low socioeconomic circumstance.

Objective
To evaluate the success of the program in improving nutrition knowledge via the Healthy Eating Pyramid (HEP).

Design
The program was implemented over a 9 month period from 31st October 2011 to 30th June 2012. Overall, 130 nutrition sessions (2hrs duration) were delivered to 467 participants from Australia and 45 other countries. Participants completed pre and post evaluation surveys (n=311) about the program and changes to their nutrition knowledge. A descriptive analysis and significance testing was conducted between matched pre/post responses.

Outcomes
The majority of participants enjoyed taking part in the program (99%) and thought it was relevant to them (96%). When participants were given a list of six foods/drinks and asked to show which section of the HEP the food/drink should be placed ie 'eat most', 'eat some', or 'eat least', significant improvements in knowledge were found with regard to vegetables (91% to 96% correct, $P<0.05$), water (92% to 96% correct, $P<0.05$), meat (74% to 83% correct, $P<0.01$) and butter (67% to 75% correct, $P<0.01$). The most significant improvement was found for bread as a 'eat most' food (23% to 60% correct, $P<0.01$). In both the pre and post surveys, the majority of respondents correctly indicated that soft drinks were an 'east least' food (88% to 92%). After participating in the program, the majority of respondents specified that the program made them think about eating a healthy diet (98%) and that they would use the knowledge learnt in the sessions (99%).

Conclusion
Foodbank WA was successful at delivering a program that was relevant and enjoyable to participants. Overall, the HEP was found to be a useful tool for improving nutrition knowledge and should be considered by health professionals when delivering programs to vulnerable groups who have the greatest health disparities.

Source of funding
Supported by grants from Government of Western Australia, Department of Health and Foodbank WA.

P16

Chocolate feeding styles

JE Standen-Holmes, DG Liem
Centre for Physical Activity and Nutrition Research, School of Exercise and Nutrition Sciences Faculty of Health, Sensory Science Group, Deakin University, Burwood, Victoria

Background
The critical role of children's carers as providers and role models for children's food intake has been of increasing interest as the international childhood obesity epidemic grows. Popular high energy-density snack foods such as chocolate are of particular concern in children's diets.

Objective
This study used the already validated, Parental Feeding Style Questionnaire(PFSQ) to investigate Australian feeding styles and the newly developed Chocolate Feeding Style Questionnaire(CFSQ) with questions based on those in the PFSQ, to investigate whether parental feeding strategies concerning chocolate differ from parental feeding strategies for regular foods in an Australian context.

Design
The sample consisted of 72 carers aged from 24 to 63 years who filled out an online questionnaire consisting of both general and chocolate specific parenting questions exploring the relationship between parental feeding styles as assessed by the Parental Feeding Style Questionnaire, and carer chocolate feeding styles as assessed by the Chocolate Feeding Style Questionnaire.

Outcomes
Factor analysis of the PSFQ found that four feeding styles explained 55.16% of variance and analysis of the CFSQ found that four feeding styles explained 49.1% of the variance. In the case of both general feeding and chocolate feeding it was found that Wardle et al's Instrumental and Emotional feeding styles merged into a Practical feeding style in which carers used food/chocolate as a tool to help achieve behavioural and well-being goals for their children. In the case of the CFSQ, two new feeding styles not found in the Parental Feeding Style Questionnaire, were Exclusionary feeding style and Weight Anxiety feeding style. The frequency with which carers fed their children chocolate was related to chocolate feeding style and general feeding style.

Conclusion
These findings suggest that feeding styles in Australia are related to but not identical to those found in Britain and the Netherlands, and feeding styles of carers vary according to the foods in question, with carers using significantly different strategies for chocolate than for regular foods.

Source of funding
C-PAN Deakin University

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Poster Session 1: Thursday 29 November

P17

The effects of large, intact pieces of vegetable and bitter flavour on satiety

P Thavaraj[1], O Kravchuk[2], E Roura[1], MJ Gidley[1]
[1] Centre for Nutrition and Food Sciences (CNAFS), University of Queensland, St.Lucia, Queensland, [2] School of Agriculture, Food and Wine, University of Adelaide, Adelaide, South Australia

Background
The extent of processing as well as bitterness may contribute to perceived satiety of vegetables. Bitter perception has been involved in appetite control through taste receptors found in the oral cavity and along the mucosa of the gastrointestinal tract.

Objective
To investigate in separate experiments if satiety is modified by (i) changing the form and extent of processing of vegetables, and (ii) the level of bitter taste in a meal by addition of Gentian extract (found in angostura bitters) or Quinine hydrochloride (present in tonic water).

Design
A preload-test meal paradigm was used to study satiety, employing a randomised balanced crossover trial in 16 healthy individuals to compare the effect of (i) raw shredded, steamed shredded, steamed cubed and raw pureed carrot in a pasta meal on satiety and (ii) four lemon based drink containing either 0/0, 0/80, 240/0 or 240/80 µg/l of Gentian/Quinine blends respectively consumed along with a broccoli based pasta preload meal. Hunger scores were recorded on a labelled magnitude scale (LMS) at regular intervals during the 3-4 hours between breakfast and lunch.

Outcomes
During the cognitive stage (first 45 minutes), relative to the other meals, the meal containing raw pureed carrots was significantly less effective in producing a feeling of satiation (P=0.012). At the post-ingestive stage, (60-120 minutes) the effect of the pureed carrots was profound and the hunger feeling was significantly higher (P=0.018) than for the other carrot preparations. At the post-absorptive phase (150-240 mins) there was no significant difference between the meals and all the panelists became hungry. The trial related to the effect of bitter taste on satiety is currently in progress.

Conclusion
The effect of carrot preparation on satiety was significant in the cognitive and post ingestive phases. It is recommended to consume larger pieces of vegetables to achieve maximum benefit in terms of delaying the return of hunger. The effectiveness of more intact vegetable preparations is particularly marked around 2 hours after consumption. This suggests that intact vegetables in a meal may decrease the tendency to snack before the subsequent meal.

Source of funding
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P18

Influence of socioeconomic background on nutrient intakes and food variety and dietary diversity scores in selected rural areas of Malaysia

SA Zainal Badari[1,2], J Arcot[1], N Sulaiman[2]
[1] Food Science and Technology, School of Chemical Engineering, Faculty of Engineering, University of New South Wales, Sydney, Australia, [2] Department of Resource Management and Consumer Studies, Faculty of Human Ecology, University Putra Malaysia, Serdang, Selangor Malaysia

Background
Food variety scores (FVS) and dietary diversity scores (DDS) were estimated based on foods consumed weekly by rural Malaysian households from a food frequency questionnaire (FFQ) to estimate intake.

Objective
To analyse the association between socioeconomic characteristics among lower-income households in rural Malaysia and with selected nutrient intakes and the FVS and DDS.

Design
A total of 284 households were chosen by systematic sampling of selected rural areas of Malaysia. FFQ was adapted from the Malaysian Adult Nutrition Survey (2003), which 126 foods were included and categorised into six food groups. The scoring of FVS and DDS were adapted and modified from Clausen *et al.* (2005), with a score ranging from 0-833 (FVS) and 0-6 (DDS) for all food groups. The head of the households completed a 2-day dietary recall (1 weekday and 1 weekend day) for nutrient information. The nutrient intake was analysed using the Nutritionist Pro™ Nutrition Analysis Software. Multiple regression was used to determine the association of FVS and DDS with selected nutrients and households' socioeconomic backgrounds.

Outcomes
Overall mean of FVS was 170.0 ± 90.3 with a range of 37-749 and majority of households (81.8%) had low FVS. The highest mean FVS were fat, oils, sugar and salt groups (43.0 ± 27.4), and fish, poultry, meat and legume groups (35.0 ± 24.0). Ninety-nine per cent of households had a high DDS, with weekly mean intake of 5.5 ± 0.8. Total food expenditure ($p<0.01$, $R^2 = 0.042$) and energy intake ($p<0.05$ $R^2 = 0.055$) of households were associated with FVS. Meanwhile sex of head of household ($p<0.05$, $R^2 = 0.020$) and energy intake ($p<0.01$, $R^2 = 0.035$) were associated with DDS.

Conclusion
Higher DDS showed that even though the households consumed food from all food groups, their diets lacked variety. Total food expenditure, sex of members in the households, and energy intakes were the main factors that influenced FVS and DDS among lower income households in rural areas of Malaysia.

Source of funding

Poster Session 1: Thursday 29 November

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Poster Session 2: Thursday 29 November

P19

Sugar content of breakfast cereals: does it matter?

F Fayet Moore[1], L Ridges[2], N Sritharan[3], P Petocz[4]
[1] Nutrition Research Australia, [2] Nestle Australia,[3]Cereal Partners Worldwide[4] Macquarie University, Sydney, NSW

Background
Breakfast cereal intake has been associated with healthier body weight and improved nutrient intake including B vitamins and fibre. It is unknown in Australia whether presweetening of breakfast cereals affects nutrient intake and body weight.

Objective
To determine whether nutrient intake and anthropometric differences exist between Australian children classified according to the sugar content of the breakfast cereal consumed (presweetened vs. minimally presweetened).

Design
Nutrient intake reported via 24-hour recalls and anthropometric measurements collected from the 2007 Australian National Children's Nutrition and Physical Activity Survey were analysed (n= 4487, 2-16y). Breakfast was defined as a caloric intake between 0500h and 0930h. Presweetened (PS) and minimally presweetened (MPS) breakfast cereal was defined as a breakfast cereal (ready to eat cereals, puffed corn, rice or wheat; muesli, oats and semolina) with sugar content of ≥15% and <15%, respectively. Children and adolescents who consumed breakfast cereal for breakfast were classified as either exclusively MPS consumers or PS consumers. Total daily energy, nutrient intake, Body Mass Index (BMI), waist circumference and physical activity measures were compared between MPS and PS consumers by anova models.

Outcomes
The average sugar content of MPS and PS breakfast cereal was 3.8% and 24%, respectively. Just over half of breakfast cereal consumers consumed a MPS cereal (51.2%) and MPS consumers had significantly smaller serving sizes than PS consumers. Among girls, both MPS and PS cereal intake decreased with age, whereas for boys, only MPS intake decreased with age. PS consumers were older than MPS consumers (8.2±0.1 y vs. 7.1±0.1 y, respectively, $P<0.01$). Total daily energy and nutrient intake of MPS consumers was not significantly different to PS consumers ($P>0.01$). No differences were found in body mass index, waist circumference and physical activity measures between groups ($P>0.01$).

Conclusion
Pre-sweetening of cereals (≥15%) did not differentially impact total daily energy or nutrient intake in Australian children. Whilst children consumed greater amounts of higher sugar cereals, anthropometric measures were not significantly different.

Source of funding
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P20

Maternal DHA supplementation during pregnancy, or pregnancy and lactation, and cognitive and visual development: a systematic review and meta-analysis of randomised control trials

JF Gould[1,2], LG Smithers[1], MM Makrides[1,2],
[1]University of Adelaide, Adelaide, SA, Australia, [2]Women's and Children's Health Research Institute, Adelaide, SA

Background
Maternal fish consumption during pregnancy has been positively associated with cognitive, visual and language abilities in the offspring, leading to the hypothesis that maternal omega-3 long chain polyunsaturated fatty acid (LCPUFA) supplementation may improve children's neurological and visual development.

Objective
The objective was to evaluate the effect of maternal omega-3 LCPUFA supplementation in pregnancy on neurological and visual development of the offspring.

Design
Five electronic databases were searched. Human randomized controlled trials (RCTs) that supplemented the maternal diet with omega-3 LCPUFA during pregnancy, or pregnancy and lactation, and assessed either neurological or visual development of the offspring were included. Trial quality was assessed and results of eligible trials were compared in meta-analyses.

Outcomes
Eleven RCTs involving 5,272 participants were included in the review. Most trials had methodological limitations. No differences in standardised psychometric test scores for cognitive, language or motor development were observed between LCPUFA-supplemented and control groups with the exception of cognitive scores in 2-5 year old children in which supplementation resulted in higher Developmental Quotient scores (Mean difference 3.92; 95% CI 0.77 to 7.08; n=156; p=0.01). However, this effect was from two trials with a high risk of bias. Due to the variety of visual assessments and range of ages it was not possible to combine studies with visual outcomes in a meta-analysis, although 6 of the 8 assessments in 5 trials reported no difference between supplemented and control groups.

Conclusion
The evidence does not conclusively support or refute that omega-3 LCPUFA supplementation in pregnancy improves cognitive or visual development.

Source of funding
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Poster Session 2: Thursday 29 November

P21

A systematic review of randomised controlled trials of dietary intervention during pregnancy on birth weight

E Gresham, JE Byles, AJ Hure
University of Newcastle, Newcastle, NSW

Background
Birth weight is an important predictor of short and long term health outcomes for the offspring, such as cognitive functioning and neurodevelopment, diabetes and cardiovascular disease.

Objective
To systematically review the literature to determine whether dietary intervention during pregnancy effects birth weight.

Design
Ten electronic databases were searched. Two independent reviewers assessed each article to determine eligibility. Studies of whole diet or dietary components were included; supplement-only trials were excluded. Methodological quality was assessed using the Academy of Nutrition and Dietetics, Quality Criteria Checklist for Primary Research. Reference lists of retrieved systematic reviews and meta-analyses were hand-searched. Data were extracted by one reviewer, with a second reviewer extracting a sub-sample to ensure accuracy.

Outcomes
Thirty-seven randomised controlled trials met the inclusion criteria. Eight studies contained duplicate trial populations and were excluded. Of the 29 trials included in the analysis, 27 were of positive methodological quality and two neutral. Dietary intervention included individualised dietary counseling (n=16/29), food and fortified food products to complement diet (n=11/29) or a combination of both (n=2/29). Eighty-three percent of studies (n=24/29) were undertaken in high income countries. Fifty-nine percent of trials (n=17/29) demonstrated no significant change in birth weight with dietary intervention during pregnancy. Thirty-eight percent (n=11/29) increased birth weight and one trial showed an intentional decrease among women at risk of gestational diabetes mellitus (GDM).

Conclusion
Preliminary findings indicate that dietary intervention during pregnancy can have different effects on birth weight, including no change, an increase, or an intentional decrease for infants born to women with risk factors for GDM. The types of intervention, study populations and timing of intervention will be further considered.

Source of funding
Not applicable.

P22

Associations of dietary micronutrients intake with body mass index and truncal fat in Mexican American children

IR Gunanti[1,2], GC Marks[1], A Al-Mamun[1], KZ Long[1]
[1]School of Population Health, the University of Queensland, Brisbane, Queensland, Australia, [2]Public Health Faculty, Airlangga University, Surabaya, East Java, Indonesia

Background
A number of epidemiological studies have addressed associations between micronutrient status and body adiposity. Few studies investigating associations between dietary micronutrient intake and adiposity have been conducted, especially among children.

Objective
To determine the association between the intake of micronutrients and adiposity among Mexican American children.

Design
We analyzed data from 2001–2004 US National Health and Nutrition Examination Surveys (NHANES) of 1,131 Mexican American children (8–15 years). Children's body mass index (BMI) and truncal fat mass (TrFat) was used as measures of adiposity. Daily total energy and nutrient intake from foods and beverages was collected based on 24-hour dietary-recall data. The associations of 'energy-adjusted' micronutrients intakes with adiposity were determined using linear and multinomial regression models under multiple imputation command that accommodates sample weight and potential confounders.

Outcomes
This study did not find that fatter children have higher intakes of energy (β=–1.12, 95%CI=–1.92_–0.32), although they did have a higher intake of protein (β=2.40, 95%CI=1.18_3.62). There were inverse associations between intakes of calcium, thiamine and riboflavin and BMI (β=–1.25, 95%CI=–2.33_–0.17; β=–1.32, 95%CI= –2.39_–0.30; β=–1.11, 95%CI=–2.12_–0.11) and TrFat (β=–0.84, 95%CI=–1.63_–0.05; β=–1.26, 95%CI=–2.36_ –0.15; β=–1.37, 95%CI=–2.40_–0.35). In contrast, intakes of vitamin A and retinol showed positive associations with BMI (β=0.67, 95%CI=0.06_1.27 and β=0.79, 95%CI=0.22_1.36). Intakes of α-carotene, β-carotene and vitamin C were positively associated with TrFat (β=0.15, 95%CI=0.03_0.28; β=0.43, 95%CI=0.05_0.81; β=0.23, 95%CI=0.003_0.45). Higher intakes of zinc and selenium were associated with increased risk of obesity (OR=2.14, 95%CI=1.16_3.93 and OR=2.75, 95%CI=1.33_5.71).

Conclusion
We found contrasting associations between calcium, thiamine and riboflavin intake and adiposity relative to intakes of other micronutrients that could reflect differences in the effects of these micronutrients on energy balance.

Source of funding
Not applicable.

Poster Session 2: Thursday 29 November

P23

Children with Attention-Deficit/Hyperactivity Disorder (ADHD) could improve their symptoms with higher vegetable and less non-core food intake

R Johnston[1], BJ Meyer[1], J Hirst[1], KH Ng[1], L Reece[1], N Parletta[2]
[1] School of Health Sciences, University of Wollongong, NSW, [2] Sansom Institute for Health Research, University of South Australia, SA

Background
Attention-deficit/hyperactivity disorder (ADHD) is one of the most common developmental disorders among children, characterised by inattention, hyperactivity and impulsivity symptoms that interfere with schooling and home lives. In Australia, it is estimated that 11% of school age children suffer with the disorder (Sawyer et al 2001). Evidence suggests that nutrition and diet may play an important role in the management and treatment of ADHD.

Objective
The aims were 1) to calculate the contribution of core versus non-core foods; 2) to compare nutrient intakes to recommended intakes and 3) to determine which dietary factors are related to ADHD.

Design
3-day weighed food records were analysed for 85 children aged 7-12 with ADHD (B n=61, G n=24). Foods were classified as core or non-core foods as described by the Australian Guide to Healthy Eating (Smith et al 1998). Those that were significantly correlated with inattention, hyperactivity and ADHD scores on Conners' Parent Rating Scales were entered into linear regression models with identified covariates.

Outcomes
Core and non-core food consumption was 67% and 33% respectively among participants (not significantly different between sexes). These children met the recommended intake for most nutrients except; folate (B 46%, G 79%), potassium (B 62%, G 37%), calcium (B 29%, G 54%), phosphorus (B 17%, G 20%), fibre (B 70%, G 62%). Higher fat (P=0.06), sugars/sweets (P=0.06) and snacks/sweets as % of total energy intake (P=0.05) predicted higher inattention scores; age (P=0.02), less weeks breastfed (P=0.05) and lower beta carotene (P=0.05) predicted higher hyperactivity scores; lower vegetable salicylates (P=0.04) and higher sugars/sweets (P=0.01) predicted higher ADHD scores.

Conclusion
Australian children with ADHD in this cross-sectional study are consuming excess non-core food. Higher intakes of snacks and sweet foods, as well as lower intake of beta carotene and salicylates from vegetables are also associated with worse symptoms of ADHD, supporting suggestions that parents can help manage their children's symptoms with better quality diets.

Source of funding
Not applicable

P24

Dietary patterns of Indigenous and non-Indigenous children in the Northern Territory

N Parletta[1], D Gent[1], P Cooper[2], K O'Dea[1]
[1] Sansom Institute for Health Research, University of South Australia, [2] Department of Education and Training, Northern Territory

Background
According to the 2007 Children's National Nutrition Survey (NNS), Australian children are consuming excess non-core foods and insufficient foods from the core food groups. Indigenous Australian children are at particular risk for malnourishment and poor health outcomes.

Objective
This study examined dietary patterns of remote Indigenous school children and how these patterns relate to the Australian Dietary Guidelines, the NNS and non-Indigenous school children from the same region.

Design
These data were collected at baseline as part of an RCT undertaken in 4 schools in the Northern Territory. Dietary patterns were assessed using a specifically designed food frequency questionnaire (FFQ) which includes pictures and examples of portion sizes for children to self-report in individual interviews with data collectors.

Outcomes
112 Indigenous and 26 non-Indigenous children completed the FFQ, aged 6-13 years (M=9.64±1.30). FFQ subscales showed good distributions, with skewness and kurtosis statistics within acceptable limits. Overall, 55.1% consumed takeaway food 2-4 times per week or more; 42% consumed chips/sweets and 44.9% consumed sweetened drinks at least once a day. 77.7% of Indigenous children were meeting the recommended 2 serves fruit/day compared to 69.2% non-Indigenous (likely due to fruit provided at school); 22.4% of Indigenous children consumed the recommended 3 or more serves of vegetables daily, compared to 26.9% non-Indigenous children. Indigenous children consumed significantly more takeaway foods (p<.001), sugared drinks (p=.025) and fish (p=.021) – although 29% reported they never ate fish compared to 58% non-Indigenous – and significantly less water (p<.001) than their non-Indigenous peers.

Conclusion
In this whole sample of children from remote areas of the Northern Territory, over two thirds were not meeting dietary guidelines for vegetable intake and around half consumed takeaway and non-core food frequently. Indigenous children consumed more non-core foods although had higher fish consumption. Both samples came from the same regions with access to the same food outlets. Although affordability is likely to be a confounding issue, these results highlight the need for education programs targeting all families including this at-risk group.

Source of funding
ARC-Linkage grant in partnership with Vifor Pharma.

Poster Session 2: Thursday 29 November

P25

Factors that influence consumption of fish and omega-3 enriched foods: a survey of Australian families with young children

S Rahmawaty[1,2], K Charlton[2], P Lyons-Wall[3], BJ Meyer[1,2]
[1] Metabolic Research Centre and [2]School of Health Sciences, Faculty of Health and Behaviour Sciences, University of Wollongong, NSW, [3]School of Exercise and Health Sciences, Edith Cowan University, WA

Background
Fish is an important source of omega-3 long chain polyunsaturated fatty acids (n-3 LCPUFA).

Objective
The aim of this study was to obtain the necessary information on factors that both promote, and are perceived barriers, to the consumption of fish and n-3 LCPUFA enriched products, in order to subsequently develop effective nutrition education strategies.

Design
A cross-sectional, ten-item self-administered survey was conducted in 262 parents of children aged 9-13 years from a regional centre in New South Wales. Information was collected on both frequency of consumption, and factors encouraging and preventing the provision of fish/seafood and/or n-3 LCPUFA enriched foods for their family.

Outcomes
Salmon, canned tuna, prawn and take-away fish were the most commonly eaten fish/seafood, at a frequency of approximately once a month. Health benefits, the influence of media, health professionals and health promotion activities were generally perceived as primary motivators for consuming fish/seafood, and foods enriched with n-3 LCPUFA. Among families who consume fish, taste was valued as having a major positive influence, as well as preferences of individual family members, but the latter was perceived as an obstacle in the non-fish eating group. Price was the predominantly rated barrier to consumption of fresh, but not canned, fish and foods enriched with n-3 LCPUFA in both those that do and do not consume these foods.

Conclusion
Despite Australian parents knowledge of the health benefits n-3 LCPUFA, less than 20% of households meet the recommended two serves of fish per week, hence nutrition education strategies are warranted.

Source of funding
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P26

Consumption of hamburgers, hot chips and pizza by Australian children in 2007

MD Riley, K Bastiaans, E Brindal
CSIRO Animal, Food and Health Sciences, South Australia

Background
Fast foods are considered to be both popular and poor dietary choices. The 2007 National Dietary Survey of Australian Children was used to determine the prevalence of consumption of icon fast foods and the context in which they were eaten.

Objective
To assess intake of hamburgers, hot chips and pizza by Australian children aged 2 to 16 years in 2007.

Design
Data from the computer assisted personal interview (CAPI) of the Australian National Children's Nutrition and Physical Activity Survey 2007 was used (n=4487). Data was extracted from the 24-hour dietary recall regarding how many times hamburgers, hot chips and pizza were eaten and where these foods were consumed. The relationship with age was explored.

Outcomes
The overall prevalence of consumption of hot chips was higher than that of pizza and hamburger (20.5% compared to 6.2% and 4.2%, $p<0.001$). The consumption of each food increased with age, more than doubling for hamburgers and pizza from age group 2-3 years to 14-16 years, and almost doubling for hot chips. Pizza and hot chips were predominantly eaten at the child's home or another residence (72% and 55% of total occurrences of consumption respectively), while hamburgers were more frequently eaten at the place of purchase than at home (46% compared to 31%). Hamburgers were consumed during transport on 14% of occasions compared to 5% for hot chips and 1% for pizza.

Conclusion
The intake of hot chips by Australian children of all ages was surprisingly frequent. Pizza and hot chips, common foods of quick service restaurants, are most frequently consumed at home. Similarly, a high percentage of hamburgers consumed by Australian children are consumed at home. Modifying the dietary intake of these foods for children should consider home consumption.

Source of funding
CSIRO Preventative Health Flagship, Obesity Theme.

Poster Session 2: Thursday 29 November

P27

The association between body composition and bone mass in young Australians

K Zhu[1,2], K Briffa[3], A Smith[3], J Mountain[4], AM Briggs[5], L Straker[3], J Walsh[1,2]
[1]Department of Endocrinology and Diabetes, Sir Charles Gairdner Hospital, [2]School of Medicine and Pharmacology, University of Western Australia, [3]School of Physiotherapy, Curtin University, [4]Telethon Institute for Child Health Research, [5]CHIRI, Curtin University, Perth, WA

Background
Increasing body weight is associated with higher peak bone mass. However, there are limited data on the relative importance of lean and fat mass on peak bone mass in young Australians.

Objectives
The aims of this study were to compare bone mass and bone density attained at 20 years in males and females and to evaluate the association between body composition and bone mineral measures.

Design
The study subjects were 578 girls and 611 boys from the West Australian Pregnancy Cohort (Raine Study) who had a whole body dual energy x-ray absorptiometry (DXA) scan acquired at 20 years. Lean and fat body mass, bone mineral content (BMC) and areal bone mineral density (BMD) of whole body were obtained from the DXA scan. Height and weight were measured.

Outcomes
Male subjects were significantly taller (178.3±7.1 vs 165.9±6.4 cm, P<0.001), heavier (76.8±4.0 vs 65.3±13.1 kg, P<0.001), and had significantly higher total body BMC (3174±429 vs 2692±329 g, P<0.001) and BMD (1.121± 0.108 vs 1.021±0.086 g/cm^2, P<0.001) compared to young females. After adjustment for height and body mass, the difference for total body BMC was no longer significant (2952±12 vs 2927±12 g, P=0.202), whereas the difference remained for total body BMD (1.092±0.004 vs 1.051±0.004 g/cm^2, P<0.001). In multivariate linear regression models with height, lean and fat mass as predictor variables, lean mass was the most significant predictor of total body BMC and BMD in both male (explained 64.2% and 43.4% of the variation, respectively) and female participants (explained 42.9% and 30.8% of the variation, respectively). Fat mass was a more important predictor of total body BMC and BMD in female (explained 13.1% and 7.4% of the variation, respectively) than in male (explained 1.8% of the variation for both).

Conclusion
Lean body mass was the most significant independent predictor of total body BMC and BMD in both males and females. Fat mass was a more important predictor of total body bone mass in females than in males.

Source of funding
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P28

The acute impact of a high anthocyanin cherry juice on cognition and blood pressure in young people, older people and dementia patients

K Caldwell, KE Charlton, S Roodenrys
University of Wollongong, Wollongong, NSW

Background
Anthocyanins have shown to provide specific neuroprotective effects and may improve cognitive function. Proposed mechanisms partly relate to their potential to acutely affect endothelial function, blood pressure and cerebrovascular blood flow. However, the frequency and quantity of intake of anthocyanins that is required to result in these benefits has not been determined.

Objective
To compare the effect of differing doses of anthocyanins, provided by cherry juice, on acute cognitive functioning and blood pressure in different age groups.

Design
Using a cross-over design, young adults 18-35yrs (n=6), older healthy adults, 60+yrs (n=5), and older adults with mild to moderate dementia (n=5) were assigned to receive, in random order, either a single dose of 300ml high-anthocyanin cherry juice or 3 x 100ml servings of cherry juice at 0, 1 and 2hrs. Blood pressure was measured at 0, 2 and 6 hrs. Cognitive tests, administered at baseline and 6 hrs, included a task switching test (higher executive function), a letter and pattern comparison task (speed of processing), and a RAVLT list-learning task (verbal memory). Two-way mixed-design ANOVA was conducted.

Outcomes
Regardless of dose, cherry juice had no acute impact on cognitive function in young people, older people or dementia patients. Overall, a large single dose of cherry juice resulted in a significant change in heart rate (p=0.024) and diastolic blood pressure (p=0.016), and approached significance for systolic blood pressure (p=0.066). The triple dose of juice had no significant impact on blood pressure or heart rate measurements. No group effect was evident for age, in either dose.

Conclusion
Acute intake of anthocyanins does not appear to change short-term cognitive performance. Consumption of a single large serve of cherry juice may have an acute impact on cardiovascular function in young adults, older adults and dementia patients similarly. A lack of effect for the three small servings of juice over 3 hours suggests a minimum threshold of uptake must be reached to induce bioactive effects.

Source of funding
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Poster Session 2: Thursday 29 November

P29

Dietary salt increases serum sodium but does not influence post-prandial nitrate/nitrite concentrations in healthy adults

KM Dickinson[1, 2], PM Clifton[3], JB Keogh[4]
[1]CSIRO Animal, Food & Health Science, Adelaide, SA; [2] Discipline of Physiology, Faculty of Health Sciences, University of Adelaide, SA; [3] Baker IDI, Heart and Diabetes Institute, Adelaide, SA, [4] School of Pharmacy and Health Sciences, University of South Australia, Adelaide, SA

Background
Endothelial dependent vasodilatation is impaired after consumption of a high salt meal however the mechanisms by which salt may affect postprandial vascular function are not well understood. Whether this effect is caused by decreased post-prandial nitric oxide bioavailability due to increased serum sodium concentration is unknown.

Objective
Our aim was to determine if a high salt meal containing 65mmol Na, sodium load which has previously been observed to impair flow-mediated dilatation raises post-prandial sodium and produces a reduction in plasma nitrate/nitrite concentrations (an index of nitric oxide production).

Design
We prospectively assessed serum electrolytes, plasma nitrate/nitrite, arginine vasopressin (AVP) and atrial natriuretic peptide (ANP) in 16 healthy, normotensive adults on 2 occasions separated by at least 1 day wash-out. Blood was sampled for measurement of biochemical parameters at baseline (fasting) after which subjects received 1 of 2 meals at each visit in a randomised order- either a low salt control tomato soup (5mmol Na) or a high salt tomato soup meal (65mmol Na). Outcomes were recorded every 30 minutes up to 2 hours.

Outcomes
There were significant increases in plasma sodium, osmolality and chloride in response to the high salt meal compared with the low salt meal. Plasma nitrate/nitrite concentrations were not significantly different between meals (meal P =0.812; time P=0.45; meal x time interaction P=0.50). Plasma ANP and vasopressin were not significantly different between treatments. There was no significant effect of the high salt meal on blood pressure compared with the low salt meal.

Conclusion
A meal containing 3.8g salt increases plasma sodium but does not alter post-prandial nitrate/nitrite concentration compared with a low salt meal in healthy individuals. Further research is needed to explore the mechanism by which salt may affect vascular function in the post-prandial period.

Source of funding
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P30

The effect of GSTT1 deletion and serum B12 on the incidence of polyps

K McDowell[1], M Lucock [1], Z Yates [1], S Tang[1], P Roach[1], M Veysey[2]
[1]Nutrition, Food and Health Research Group, University of Newcastle, [2] Teaching & Research Unit, Northern Sydney Central Coast Health, Gosford, NSW

Background
GSTT1 deletion has been implicated as an altering factor for colorectal cancer risk. Colorectal polyps are indicated as possible precursors for colorectal cancer.

Objective
To examine whether a relationship exists between GSTT1 deletion and serum B12 as a predictor for colorectal polyps in subjects undergoing routine screening for colonic pathology.

Design
212 patients, aged 40 to 89 years (mean 61.8 years), undergoing routine colonic pathology screening were recruited from a gastroenterology clinic. Participants supplied blood samples, from which serum B12 levels were calculated using chemiluminescent immunoassay. GSTT1 deletion was determined using polymerase chain reaction and gel electrophoresis.

Outcomes
A significant relationship was found between increasing serum B12 levels and the incidence of polyps for those possessing GSTT1 deletion (P = 0.0055). This association was not found for subjects who possessed the functional GSTT1 variant, or for subjects when genotype was not considered. Emerging evidence suggests that complex nutrient-gene and nutrient-nutrient interactions influence the risk for colorectal cancer, including nutrients utilised in one-carbon metabolism, such as folate and B12.

Conclusion
A significant association was found between increasing serum B12 levels and the incidence of polyps for subjects with GSTT1 deletion. Future research regarding relationships involving GSTT1 deletion and serum B12 may contribute to a greater understanding of the mechanisms underpinning colorectal cancer risk.

Source of funding
NSCCH

Poster Session 2: Thursday 29 November

P31

Can reported short-term dietary intake predict fatty liver?

HM Parker[1], SE Keating[1], HT O'Connor[1], JS Cohn[2], I Caterson[1], J George[1], NA Johnson[1]
[1]University of Sydney, [2] Heart Research Institute, Sydney, NSW

Background
Non-alcoholic fatty liver disease (NAFLD) is associated with obesity, type 2 diabetes and cardiovascular disease. It is known that dietary interventions can alter liver fat; for instance, supplementation with omega-3 polyunsaturated fatty acids has been shown to reduce liver fat. However, it is not known how well reported dietary intake can predict the likelihood of developing fatty liver.

Objective
To ascertain whether reported short-term dietary intake can predict NAFLD in overweight adults.

Design
57 overweight or obese adults completed a three-day food record. Food records were validated by a dietitian, and average daily intake for macro- and micronutrients, including polyunsaturated fatty acids (PUFAs), was determined by analysis in FoodWorks™. Liver fat was quantified by magnetic resonance spectroscopy (MRS), which was undertaken within 7 days of completing the food record. Differences between groups were compared by Student's t-test.

Outcomes
From preliminary analyses conducted in 34 men who have completed the trial, 11 had NAFLD as per MRS criterion (≥5.5% liver fat). Liver fat was significantly higher in the NAFLD vs. the non-NAFLD group (12.8 ± 2.4% vs. 2.6 ± 0.3%, $p<0.001$) (mean ± SE). There were no differences in age, weight, or waist circumference between groups, but body fatness (25.2 ± 0.9% vs. 22.4 ± 0.6%) was higher in the NAFLD vs. non-NAFLD group, respectively ($p=0.011$). BMI tended to be higher in NAFLD vs. non-NAFLD (28.5 ± 0.5 vs. 27.6 ± 0.3, $p=0.054$). There were no significant differences in reported total energy intake or macronutrient composition between NAFLD and non-NAFLD groups ($p>0.05$ for all). Total PUFA intake tended to be lower in NAFLD vs. non-NAFLD (15.9 ± 1.2 vs. 11.9 ± 2.1 g/day, $p=0.103$)

Conclusion
These preliminary findings from a small cohort of adults suggest that percentage body fat may predict the risk of fatty liver. On the basis of reported short-term dietary intake, energy intake, macronutrient and PUFA consumption may not predict those at risk of NAFLD but further research is warranted.

Source of funding
This research is supported by Blackmores and the Diabetes Australia Research Trust (DART).

P32

Comparative effects of ALA, EPA, and DHA in diet-induced obese rats

H Poudyal[1], L Brown[2]
[1]School of Biomedical Sciences, The University of Queensland, Brisbane, QLD; [2]Department of Biological and Physical Sciences, University of Southern Queensland, Toowoomba, QLD

Background
The three major dietary n-3 PUFA, α-linolenic acid (ALA; C18:3n-3), eicosapentaenoic acid (EPA; C20:5n-3) and docosahexaenoic acid (DHA; C22:6n-3), may produce distinctly different responses on the risk factors for metabolic syndrome. However, the paucity of comparative studies involving all three individual n-3 PUFA provides a weak basis for assuming different responses in the pathophysiology of chronic diseases.

Objective
To show that ALA and EPA/DHA produce different physiological responses to decrease the risk factors of the metabolic syndrome in high-carbohydrate, high-fat diet-induced obese rats.

Design
Male 8 week old Wistar rats (n=12/group) were fed either a high carbohydrate (fructose), high fat (tallow) diet (H) or a high carbohydrate (cornstarch), low fat diet (C) for 16 weeks. 3% dietary ALA-rich chia oil, EPA-rich fish oil or DHA-rich fish oil was administered from the 8th week of 16 weeks C or H diet feeding in n-3 oil supplemented groups. Metabolic, cardiovascular and hepatic structure and function were assessed at the end of 16 week.

Outcomes
In this study, we have shown that ALA and EPA/DHA produced different physiological responses to decrease the risk factors of the metabolic syndrome in high-carbohydrate, high-fat diet-induced obese rats. At the same dosage, ALA did not reduce total body fat but induced lipid redistribution away from the abdominal area and decreased glucose tolerance, insulin sensitivity, dyslipidemia, hypertension, and left ventricular dimensions, contractility, volumes and stiffness. EPA and DHA increased sympathetic activation, reduced the abdominal adiposity and total body fat and attenuated insulin sensitivity, dyslipidemia, hypertension and left ventricular stiffness but not glucose tolerance. However, ALA, EPA and DHA all reduced inflammation in both the heart and the liver, cardiac fibrosis and hepatic steatosis.

Conclusion
Since the physiological responses to EPA and DHA were similar, it is likely that the effects are mediated by DHA with EPA serving as a precursor. Also, ALA supplementation increased DHA concentrations but induced different physiological responses to EPA and DHA. This result strongly suggests that ALA has independent effects in the metabolic syndrome, not relying on its metabolism to DHA.

Source of funding
Not applicable

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P33

Betanin-rich red pitaya juice attenuates the metabolic and cardiovascular signs of high-carbohydrate, high-fat diet induced obesity in rats

NS Ramli [1], L Brown[2], A Rahmat[1]
[1]Department of Nutrition and Dietetics, Universiti Putra Malaysia, Serdang Selangor Malaysia, [2]Department of Biological and Physical Sciences, University of Southern Queensland, Toowoomba, Queensland

Background
Previous studies have shown that red pitaya fruit may protect aorta from oxidative damage and improve lipid profiles in hypercholesterolemic rats due to incremental improvement in antioxidant activities and a reduction in lipid peroxidation.

Objective
To investigate whether red pitaya juice has therapeutic effects on high carbohydrate, high fat diet fed obese rats

Design
Male Wistar rats were randomly divided into 2 groups based on their diet for 16 weeks; corn starch–rich diet-fed rats (C; n = 12) and high-carbohydrate, high-fat diet-fed rats (H; n = 12). The rats developed hypertension, dyslipidemia, impaired glucose tolerance, excess fat deposition and increased proinflammatory markers. Red pitaya juice (5 % in the diet) was administered for the last eight weeks.Total fat mass was determined with DXA scan. Abdominal adiposity index was determined from the excised adipose tissue. Heart function was determined with echocardiography. Glucose and insulin tolerance were measured with OGTT and ITT.

Outcomes
Red pitaya juice attenuated total fat mass, abdominal obesity index and abdominal adipose tissue masses ($P<0.05$). Glucose and insulin tolerance were improved, and fasting plasma glucose was lower compared with non-treated rats ($P<0.05$). Red pitaya reversed cardiovascular remodelling with a reduction in left ventricular eccentric hyperthrophy, left ventricular masses and cardiac stiffness ($P<0.05$). Blood pressure was normalised ($P<0.05$).

Conclusion
We conclude that red pitaya ameliorates many pathophysiology associated with metabolic syndrome, probably due to the antioxidant activity contributed by its polyphenol content.

Source of funding
Not applicable.

P34

The effect of nutrition and lifestyle intervention on cardiovascular disease risk factors in Korean migrants residing in Melbourne, Australia

HH Sung, KN Antonas, XQ Su
Biomedical and Lifestyle Diseases Unit, Biomedical and Health Sciences, Victoria University, Melbourne, Victoria

Background
Asian migrants in western countries tend to increase dietary fat and animal protein intakes, and that could result in a high prevalence of lifestyle-related disease such as cardiovascular disease. Korean migrants are one of the top ten ethnic groups in Australia and cardiovascular disease (CVD) is the second most common cause of death among Koreans. There is limited understanding about the health and nutritional status of Korean migrants.

Objective
A culturally tailored pilot study was conducted among Korean migrants living in Melbourne to determine whether nutrition and lifestyle intervention can improve CVD risk factors.

Design
Thirty Koreans (aged 30-65 yrs) residing in Melbourne for a minimum of one year were recruited in 2011. General information on participants was collected at baseline. Fasting blood samples were taken at baseline and week 8 for analyses of cardio-metabolic biomarkers along with the administration of a health and wellbeing survey. Dietary intakes based on 3-day food diaries were assessed using *Foodworks.* Anthropometry and blood pressure were measured every fortnight for 8 weeks. Ethnic specific values for body mass index and waist circumference were adopted.

Outcomes
There was a significant decline in waist circumference and hip circumference over the 8-week intervention ($P<0.005$). A significant improvement in total cholesterol ($P<0.05$), low-density-lipoprotein cholesterol ($P<0.001$) and high-density-lipoprotein cholesterol ($P<0.001$) was observed. Additionally, a significant increase in daily calcium intake was also recorded ($P<0.01$). Although not significant, there was an improvement in other known dietary risk factors of CVD, including a moderate increase in daily intake of unsaturated fatty acids and fibre. Furthermore, a significant increase in the frequency of exercise ($P<0.0001$) and a trend in the reduction of smoking and alcohol consumption were observed.

Conclusion
The combination of modified dietary intake and increased physical activity level over 8 weeks can improve central obesity level and cardio-metabolic parameters.

Source of Funding
This project was supported by the School of Biomedical and Health Sciences, Victoria University, Melbourne.

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P35

Exploring the link between diabetes and glycogen structure

MA Sullivan[1], J Li[2], C Li[2], F Vilaplana[1], L Zheng[2], S Bowen[3], A Gray-Weale[4], D Stapleton[5], RG Gilbert[1]
[1]Centre for Nutrition & Food Sciences, University of Queensland, Brisbane, Queensland, [2]College of Life Sciences, Wuhan University, Wuhan, China, [3]Southern Cross Plant Genomics, Southern Cross University, Lismore, Queensland, [4]School of Chemistry, Monash University, Victoria, [5]Bio21 Institute, University of Melbourne, Victoria

Background
Liver glycogen (with molecular weights as high as 10^8 and a branching frequency of approximately 9%) acts as a blood glucose buffer, storing and releasing glucose in response to the body's physiological needs. Type 2 diabetes, a disease tightly associated with high blood glucose levels, costs Australia billions of dollars per year, whilst substantially decreasing sufferers' standards of living. Worldwide, type 2 diabetes associated problems are increasing because of lifestyle changes.

Objective
To compare the glycogen structure of healthy and type 2 diabetic (db/db) mice.

Design
The weight distribution and the weight average molecular weight as a function of size (hydrodynamic radius *R*h) for undegraded native glycogen, isolated from these mice were determined using SEC separation with differential refractive index (DRI) and multiangle laser light scattering (MALLS) detection respectively. Debranched glycogen distributions were obtained using 8-amino-1,3,6-pyrenetrisulfonic acid (APTS) labelled chains, which were analyzed with a DNA sequencer.

Outcomes
Type 2 diabetic (db/db) mice were unable to form the large glycogen particles seen in healthy mice. A small difference in the chain-length distributions of diabetic mice was also seen, with db/db mice forming fewer long chains.

Conclusion
The fundamental differences between the glycogen from these mice present a new way of understanding diabetes and may potentially lead to detection and improvement in clinical treatment for this disease.

Source of funding
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P36

Bone mineral density, sodium excretion and dietary intake in people with coeliac disease: a pilot study

KM Turner[1], PM Clifton[2], JB Keogh[1]
[1]School of Pharmacy and Medical Science, University of South Australia, Adelaide, SA, [2]Laboratory head , Nutritional Interventions, Baker IDI Heart and Diabetes Institute, Adelaide, SA

Background
People with coeliac disease who require a gluten free diet may have a lower bone mineral density. A high sodium intake is associated with bone loss.

Objective
Our aim was to determine the bone mineral density (BMD) and sodium excretion in a group of people with coeliac disease.

Design
A pilot study of people with coeliac disease was conducted. BMD at the lumbar spine (LS) and hip was measured using dual energy X-ray absorptiometry (DEXA) and sodium (Na), potassium (K), calcium (Ca) and creatinine (Cr) excretion by 24hr urine collection. Dietary intake was assessed using 3-day weighed food records (WFR). Data are presented as mean±SD.

Outcomes
Eighteen females and one male (56.7±12.5 yr, body mass index 25.5±4.6 kg/m^2) participated in the pilot study. BMD was 1.12±0.21 g/cm^2 at LS and 0.93± 0.14 g/cm^2 at the hip. Age matched Z-scores were -0.15±1.2 and -0.61±0.9 at LS and hip respectively. Na excretion was 113±93 mmol/24hr (range 58 - 246 mmol/24hr), K excretion 93±24 mmol/24hr (range 51 – 138 mmol/24hr), Ca excretion 4.6±2.0 mmol/24hr (range 1.3 - 8.9 mmol/24hr). Cr excretion was within the normal range for all participants. Energy and fibre intake were 7826±1358 kJ/day and 30±13g/day respectively. Macronutrient percentage energy was protein 19%, total fat 33% carbohydrate 43%, fibre 3% and alcohol 1%.

Conclusion
Average sodium excretion was close to the National Health and Medical Research Council Upper Limit of 100mmol/day. This may be due to a low intake of breads and cereals in this group. BMD at the hip appears reduced.

Source of funding
Not applicable.

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P37

δ-Tocotrienol from annatto oil ameliorates metabolic syndrome developed in high carbohydrate, high fat-diet fed rats

WY Wong[1], L Brown[2], L Ward[3]
[1]School of Biomedical Sciences, [3]School of Chemistry and Molecular Biology, The University of Queensland, Brisbane
[2]Department of Biological and Physical Sciences, University of Southern Queensland, Toowoomba, Queensland

Background
Previous studies *in vitro* have shown that tocotrienols can inhibit adipocyte proliferation mediated via a PPAR-γ mechanism. This raises the possibility that tocotrienols could act as anti-obesity agents *in vivo* thereby potentially having beneficial action on metabolic syndrome.

Objective
This study investigated the effects of one of the tocotrienols, δ-tocotrienol from annatto oil, on diet-induced cardiovascular and metabolic disorders in rats.

Design
Twelve male Wistar rats were fed a high carbohydrate, high fat diet for 16 weeks. Rats developed hypertension and left ventricular hypertrophy with increased ventricular stiffness, abdominal fat deposition with poor lipid profile, impaired glucose and insulin tolerance, and impaired hepatic function. δ-Tocotrienol 120 mg/kg/d was administered for the last eight weeks. Total fat mass was determined with DXA scan. Abdominal adiposity index was determined from the excised adipose tissue. Heart function was determined with echocardiography and Langendorff heart preparation. Glucose utilisation was determined by OGTT. Plasma was collected to determine the lipid profile and liver function. Heart and liver histology was performed for collagen deposition and inflammatory cell infiltration.

Outcomes
δ-Tocotrienol attenuated total fat mass and abdominal circumference ($P<0.05$). Retroperitoneal and epididymal adipose tissue weights were reduced ($P<0.05$). This contributed to lower visceral adiposity index ($P<0.05$). Lipid profile was improved with lower total cholesterol, NEFA, and TAG, suggesting possible lipolysis and β-oxidation of fatty acids. δ-Tocotrienol improved glucose and insulin tolerance, normalised blood pressure, reduced ventricular stiffness, and improved liver function in these rats ($P<0.05$). Histological examination showed reduced inflammatory cell infiltration in heart and liver ($P<0.05$)

Conclusion
We conclude that δ-tocotrienol improved many of the pathophysiological changes in metabolic syndrome.

Source of funding
Not applicable.