**Review Sessions**

**Sunday, May 12, 2013**

**T1:RS1 – Neuroscience**

**T1:RS1.1 Fuel sensing by the brain**

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**Introduction:** Variations in blood nutrient concentrations are detected by specialized neurons located in several brain areas with a high prevalence in the hypothalamus and brainstem. These neurons are involved in homeostatic control of glucose homeostasis, energy expenditure, and feeding behavior, in part through regulation of autonomic nervous activity. They also regulate hedonic control of food intake, in large part through their input to the mesolimbic dopamine reward system. We are interested in the specific role of glucose as a regulator of these mechanisms.

**Methods:** We have generated mice with whole body or brain specific inactivation of the Glut2 gene, the first element in the Glut2/Glucokinase/KATP channel signaling pathway that controls glucose-induced insulin secretion but also glucose sensing in extra-pancreatic cells, including some neuronal populations. We tested the effect of Glut2 inactivation in the brain on the control of sympathetic and parasympathetic nervous activity, on pancreatic beta-cell mass and function, and initiated the characterization of the glucose-dependent electrophysiological activity of Glut2-expressing neurons.

**Results:** Suppressing Glut2 expression in the brain abolished the regulation by glucose of both sympathetic and parasympathetic nerve activities. Impaired parasympathetic activity reduced beta-cell proliferation in the postnatal period and prevented establishment of the normal beta-cell mass in adult mice. These defects in glucose responsiveness of the autonomic nervous system lead to suppression of first phase insulin secretion in adult mice, to long-term development of glucose intolerance, and to exaggerated glucagon secretion. Patch-clamp analysis of the Glut2 neurons of the brainstem showed that they are activated by hypoglycemia. Because they are GABAergic and project to the dorsal motor nucleus of the vagus, they may control parasympathetic activity.

**Conclusion:** We have identified central glucose sensing neurons that are at the origin of a brain-endocrine pancreas axis that control beta-cell proliferation, mass and function.

1. **Conflict of Interest:** None to declare
2. **Funding:** Research related to this abstract was funded by the Swiss National Science Foundation and a European Research Council grant.

**T1:RS1.2 CNS control of energy metabolism**

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The hypothalamus is well known as a crucial regulator of both energy intake and energy expenditure. Based on data gleaned recently the CNS has also emerged as a relevant regulator of nutrient partitioning, changing the levels of adiposity independent of food intake. The fact that the CNS plays a key role in mediating feeding behavior, energy expenditure and nutrient partitioning reinforces the hypothesis that signals in the CNS are likely the most powerful pathways influencing energy homeostasis. Indeed, several anatomical, pharmacological, genetic and physiological studies have demonstrated that specific hypothalamic neuronal populations regulate peripheral lipid metabolism. Among these leptin, ghrelin, thyroid hormones, melanocortins, glucagon-like peptide 1, resistin, insulin and NPY have been shown to be involved in the brain-adipose tissue crosstalk. Furthermore, it has been started to be uncovered the consequences of disruption of these central mechanisms on endpoints such as fat mass, liver steatosis and circulating levels of different biomarkers linked to cardiovascular risk. The precise knowledge of the metabolic brain-periphery crosstalk might allow for the development of drug targets for the treatment of obesity and its associated comorbidities.

**T1:RS1.3 Is neural regulation of satiation more important than hormonal regulation of satiation?**

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**Introduction:** Satiation is both modulated by neural regulation via the vagal nerve and hormonal regulation via gastrointestinal hormones such as glucagon-like peptide 1 and cholecystokinin. The relative importance of neural versus hormonal regulation of satiation was studied.

**Methods:** Twelve pigs underwent either sham surgery (n=6) or total subdiaphragmatic vagotomy (n=6) on the abdominal level to block vagal regulation via the vagal nerve. During a study day pigs received a standardized morning meal, with either placebo, which was saline, exendin (9-39) at 0.5 mmol/kg.min, devazepide at 2 mmol/kg.min or combination of exendin and devazepide. In four separate study days pigs were studied using a latin square with an incomplete randomized block design. Pigs were exposed to an ad libitum meal and food intake behavior was measured. Blood samples were taken to monitor incretin release.

**Results:** Small differences in food intake behavior were observed. Vagotomy did not alter food intake behavior. Blockade of receptors appeared to effect food intake behavior more than subdiaphragmatic vagotomy. This suggests that neural innervation is less important in regulating food intake behavior than hormonal regulation. This is based on both specific and a combination of receptor blockade.

**Conclusion:** Both hormonal and neural factors are important in satiation regulation. Overall hormonal factors may be more important in the regulation of satiation as compared to neural regulation.

1. **Conflict of Interest:** None Disclosed
2. **Funding:** Research relating to this abstract was funded by Top Institute of Food and Nutrition.

**T1:RS1.4 The Effects of High Intensity Exercise on Central Neural Responses to Images of Food**

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**Background:** The gut hormones PYY and ghrelin have been shown to modulate appetite and brain activity in regions that regulate reward. The present study aimed to examine the effects of intense exercise on sensations of appetite, PYY and ghrelin release, and central neural responses to food images.

**Methods:** Sixteen lean healthy males (age 22.3 ± 3.1 yr; BMI 24.0 ± 2.5 kg/m²) completed two trials, exercise and rest, in a counterbalanced order. Following 60 min of exercise (70% VO2max) or rest a functional MRI assessment was performed while images of high-calorie and low-calorie foods were viewed.

**Results:** Exercise significantly suppressed hunger and ghrelin, whilst increasing thirst, fullness and PYY. Following exercise, neural responses to...
images of high-calorie foods significantly increased dorsolateral prefrontal cortex (DLPFC) activation and suppressed left orbitofrontal cortex (OFC) and left hippocampus activation compared with rest. The increased activation in the DLPFC was correlated with the increased PYY release during the exercise trial. In addition, exercise increased left insula and putamen neural responses to images of low-calorie foods compared with rest. Furthermore, left pallidum activation was significantly elevated when viewing low-calorie images following exercise and this response was positively correlated with greater sensations of thirst during the exercise trial.

**Conclusions:** These findings demonstrate that high intensity exercise modulates appetite-regulating hormones. Furthermore, it was observed that neural activity in reward-related regions of the brain increased in response to images of low-calorie foods, and was suppressed when viewing images of high-calorie foods post-exercise.

1. **Conflict of Interest:** None Disclosed
2. **Funding:** No Funding

**T2:RS1 – Mental Health and Obesity**

**T2:RS1.1 Food Addiction: Fact or Fiction?**

**Fletcher PC**

There is a growing interest in the concept of “food addiction” as an explanation for the rapid and disturbing worldwide increase in obesity. Indeed, in the media and amongst many scientists, the concept is so well-accepted that it forms the basis for discussions and studies, with people accepting the importance of addiction-like processes as important drivers to over-eating. This, in turn, has possible implications for interventions, at the levels of the individual and the population.

I wish to consider the nature and strength of the evidence supporting the food addiction model, particularly with respect to studies on eating and obesity in humans. I will outline theoretical and empirical distinctions between goal-driven and habitual actions and assess whether this distinction, which is key to our understanding of addiction, has been adequately explored in the context of eating and over-eating.

I conclude that, while there is clear theoretical value in applying concepts developed and refined in the addiction fields, actually the current evidence does not support food addiction as a major drive towards abnormal eating behaviour. I will go on to consider ways in which insights from studies of reward and reinforcement may assist in refining and developing our understanding of pathways towards obesity.

**T5:RS1 – Personalised Medicine**

**T5:RS1.1 Can genotype be used to tailor treatment?**

**Corella D**

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**Introduction:** We know that current treatments for losing weight are not successful for many people. So, as an alternative to the general strategy of one-size-fits-all, a more individualized approach is proposed through personalised Medicine based on the genome. According to this, the genotype of each individual will optimize the outcome of the treatment (diet, physical activity, etc). However, despite the many genes and genetic polymorphisms discovered and associated with obesity, we still do not really know how to apply this knowledge to the treatment. Our aim is to review the main genetic variants associated with obesity and the existing evidence on their application in possible treatments.

**Methods:** Review of the evidence available on the association of the different genotypes with obesity, their environmental interactions and their possible application in treating obesity.

**Results:** There are many genetic variants consistently associated with different anthropometric measurements. Also, many gene-environment interactions have been described that could apply to the treatment. However, the consistency of these interactions is very low. On the other hand, we do not really know whether the genotypes associated with higher obesity risk are those that respond better or worse to the different treatments, once obesity has taken hold in an individual. We have, moreover, noted the need to understand the concepts of biological gene-diet interactions and statistical gene-diet interactions better.

**Conclusions:** The use of genotypes to tailor obesity treatment still requires further research so as to increase the level of evidence for its optimum application.
**T5:RS1.2**
Can phenotype predict success in obesity management?
**Blüher M**

**Introduction:** Obesity is associated with an increased risk of premature death and represents a fast growing worldwide health problem that is reaching epidemic proportions. Obesity significantly increases the risk of developing metabolic disorders, hypertension, coronary heart disease, stroke, and several types of cancer. However, a subgroup of “healthy” obese patients seems to be protected against metabolic and cardiovascular obesity co-morbidities. However, it is still unclear whether specific obesity subphenotypes, such as healthy obese patients may help to predict the individual treatment success in obesity management.

**Recent Findings:** Individuals with obesity typically develop type 2 diabetes, dyslipidemia, fatty liver disease, gout, hypertension and cardiovascular disease. In the last years it became clear that up to 30% of obese patients are metabolically healthy with insulin sensitivity similar to healthy lean individuals, lower liver fat content, and lower intima media thickness of the carotid artery than the majority of metabolically “unhealthy” obese patients. Recent studies suggest that protection against development of hepatic steatosis, ectopic fat deposition, inflammation of visceral adipose tissue and adipose tissue dysfunction contribute to healthy obesity.

**Conclusion:** For the stratification of obesity treatment, definition of metabolically healthy or high-risk phenotypes will facilitate the identification of the obese person who will benefit the most from early lifestyle, bariatric surgery or pharmacological interventions.

1. **Conflict of Interest:** None disclosed
2. **Funding:** No Funding

**T5:RS1.3**
Melanocortin-4 Receptor mutations and polymorphisms do not affect weight loss after bariatric surgery

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**Introduction:** Bariatric surgery is the most effective long-term weight-loss therapy for severe and morbidly obese patients. Melanocortin-4 Receptor (MC4R) mutations, the most frequent known cause of mono- genetic obesity, affect the regulation of energy homeostasis. The impact of MC4R mutations and polymorphisms do not affect weight loss and body composition over one year after bariatric surgery.

**Methods:** A total of 648 patients, who were referred to bariatric surgery in a single clinical nutrition department, were genotyped for their MC4R status. The following four groups were categorized: functional mutations, single nucleotide polymorphisms (SNPs): Val103Ile (V103L) and Ile251Leu (I251L), variant rs17792313 (downstream of MC4R) and SNP A-178C on the promoter. Each patient was matched with two randomly paired controls without mutation. Matching factors were age, sex, baseline weight and type of surgery procedure (Roux-en-Y gastric bypass and adjustable gastric banding). We compared weight loss between cases and controls at 3, 6 and 12 months after surgery.

**Results:** Among 648 patients, we identified 9 carriers of functional MC4R mutations, 10 carriers of MC4R V103L and I251L SNPs, 7 carriers of the rs17792313 variant and 22 carriers of the A-178C SNP. Weight loss at 3, 6 and 12 months did not differ between cases and controls, whatever the MC4R mutations.

**Conclusion:** This is the first case-control study to show that MC4R mutations and polymorphisms do not affect weight loss and body composition over one year after bariatric surgery.

1. **Conflict of Interest:** None disclosed
2. **Funding:** Research relating to this abstract was funded by a research grant from the foundation NRJ- Institute de France. M. Valette is supported by a fellowship from the University Paris 13.

**T5:RS1.4**
Psychometric characterisation of an obese population and their response to bariatric surgery

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**Background:** Gastric bypass surgery has become a routine treatment of morbid obesity. Although the physiological factors relating to surgically-induced weight loss have received attention, psychological factors relating to weight loss success require further elucidation.

**Method:** 766 morbidly obese participants (605 females, 159 males) undergoing RYGBP surgery were given the TFEQ (Stunkard & Messick, 1985) to characterise pre-surgical eating behaviour. Following one-year a sample of 117 post-surgical participants completed a further TFEQ.

**Results:** At baseline, participants were characterised by a low Restraint and high Disinhibition and Hunger score. Following surgery, participants lost a significant amount of weight (females -37.39 kg, males -45.89kg). A significant decrease in Disinhibition and Hunger and an increase in Restraint occurred. An increase in Restraint and a decrease in Disinhibition were associated with a greater reduction in body weight for females only. Regression analyses (after controlling for weight, age and gender) indicated that a decrease in Disinhibition and Internal Disinhibition predicted a greater success at BMI reduction.

**Conclusion:** At baseline the TFEQ eating behaviour traits are associated with body weight in bariatric patients, showing a similar profile to a non-bariatric population. However, TFEQ factors exerted more influence over body weight in females than males. Following surgery Disinhibition was related to weight loss success. This suggests targeting the reduction of trait Disinhibition would be beneficial for weight loss success.

**Reference**
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1. **Conflict of Interest:** None disclosed
2. **Funding:** No Funding
Monday, May 13, 2013

T2:RS2 – Activity, Dietary Patterns and Obesity

T2:RS2.1 European diets: Traditional vs processed food

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Introduction: Europe is characterized by its diet diversity, which is a distinction of each European country cultural heritage. In the last decades, there is a general transition to a more westernized diet, which includes non-traditional and processed foods. The aim is to analyse the shifting of traditional diets in European countries and the relationship with prevalence of obesity and other health outcomes.

Methods: Studies published in the last 30 years dealing with the relationship of dietary habits and non-communicable diseases in Europe have been reviewed.

Results: Since the publication of the results of the “Seven countries study”, the Mediterranean diet (MD), the traditional diet of the Mediterranean countries has been linked to a reduced risk of non-communicable diseases such as: cardiovascular disease, several types of cancer or type 2 diabetes. Recent data from the Greek cohort of the EPIC study confirm these effects and also have shown an inverse association of adherence to the MD with cerebrovascular disease. Low adherence to the MD has also been linked to higher prevalence of obesity and acne in children and higher risk for the metabolic syndrome in adults. Also the South European Atlantic Diet or the traditional Nordic diet have been linked to lower mortality when compared to a more westernized diet. Consumption of street food, ready meals and low cooking skills have been linked to higher BMI and higher prevalence of hypertension.

Conclusions: Several studies performed in Europe in the last 30 years indicate that sticking to traditional diets which have been characterized as healthy is associated with lower incidence of non-communicable diseases and mortality.

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T2:RS2.2 Dietary lipids and cultural differences

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Dietary lipid composition differs significantly between individual countries worldwide. Fatty acid (FA) composition of dietary lipids is reflected in FA composition of serum lipids, predominantly cholesterol esters and triglycerides as well as of adipose tissue triglycerides. Long-term composition of dietary fat is reflected in subcutaneous adipose tissue triglycerides FA. Nevertheless, serum and adipose lipid fatty acid composition is influenced also by endogenous lipogenesis, preferential lipid oxidation and metabolic processing of fat. In addition, genetic factors influence FA composition of serum and adipose lipids. Gut microbiota may shape the host metabolic activity and FA composition by increased nutrient absorption from the diet, prolonged intestinal transit time, increased uptake of circulating triglycerides, enhanced de novo lipogenesis etc. Fatty acids and their metabolites modulate gene expression, FA composition of cell membranes, lipid metabolism, platelet function, inflammation, endothelial function and insulin resistance. Adipose tissue development (hypertrophy and hyperplasia of adipocytes) is influenced by FA supplementation. Fatty acid based lipid mediators eg. lipoxins, resolvins, protectins and maresins exert anti-inflammatory and pro-resolving effect. Changes in dietary fatty acid composition affect health conditions (obesity, type 2 diabetes, coronary heart disease etc) by these multiple mechanisms. On the opposite, health conditions (eg.insulin resistance) may affect FA metabolism in response to dietary FAs. Fatty acid composition of adipose triglycerides in European countries will be discussed.

1. Conflict of Interest: None disclosed
2. Funding: Supported by grant IGA NT/13735-4 Internal Grant Agency Czech Ministry of Health

T2:RS2.3 Metabolic profile before and after short-term overfeeding with a high fat diet: a comparison between South Asians and Whites

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Background: For the same BMI, South Asians have a higher body fat percentage and an adverse metabolic profile compared to Whites. We aimed to determine the metabolic profiles in South Asians and Whites matched for body fat, after short-term overfeeding with a high fat diet. Methods: Subjects were ten healthy non-diabetic South Asian men matched for body fat percentage with 10 white men. A weight maintenance diet containing (fat:carbohydrate:protein = 30En%: 55En%: 15En%) was provided for 3 days followed by 4 days of overfeeding (150% of energy need) with a high fat diet (fat:carbohydrate:protein= 60En%: 25En%: 15En%). Before and after overfeeding, the metabolic profile including plasma glucose, insulin, triglycerides, free-fatty acids, total and HDL cholesterol were analyzed. Glucose clearance was calculated from a 2-hour oral glucose tolerance test.

Results: Overfeeding decreased plasma triglycerides by 0.4 ± 0.6 and 0.4 ± 0.5 mmol/L for South Asians and Whites respectively (P<0.008; Δtriglyceride = 0.24), increased HDL-cholesterol (P<0.001; ΔHDL = 0.06) and decreased glucose clearance by 48.8 ± 53.5 and 37.2 ± 34.2 min/m² body surface for South Asians and Whites respectively (P<0.004; Δglucose clamp =0.18). There was a significant interaction between diet and ethnicity for the changes of total and LDL cholesterol (P=0.01; P=0.007) respectively towards a larger increase in South Asians than in Whites.

Conclusions: Despite a similar %body fat, short-term overfeeding with a high fat diet had more adverse effects on the lipid profiles of South Asians than that of Whites.
T3:RS1.4
Capturing changes in dietary patterns among older adults: A latent class analysis of an aging Irish cohort
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Introduction: Data driven approaches to dietary patterns are underutilized, particularly, Latent Class Analysis models have been rarely used. This study aimed to explore the applicability of LCA methods to classify diet patterns to determine long term diet stability.

Methods: Cross sectional and longitudinal analyses from the 1998 baseline and 2008 follow up waves of the Cork and Kerry Diabetes and Heart Disease Study. Participant diets were surveyed with a standard FFQ. Latent class analysis was used to identify mutually exclusive subgroups with different dietary patterns.

Setting: General population in the Republic of Ireland

Subjects: 923 Men and women aged 50–69 yr at baseline (n=923) and at 10-year follow up (n=320)

Results: Three dietary classes emerged: Western, Healthy and Low Energy. Significant differences in demographic, lifestyle and health outcomes were associated with class membership. Between baseline and follow-up most people remained ‘stable’ in their dietary class. Most of those who changed class moved to the healthy class. Higher education was associated with transition to a healthy diet; lower education was associated with stability in an unhealthy pattern. Transition to a healthy diet was associated with higher CVD risk factors at baseline: respondents were, significantly more likely to be smokers, centrally obese and have hypertension (though non-significant).

Conclusions: Latent Class Models are useful to explore dietary patterns and diet transitions. Understanding the predictors of longitudinal stability/transitions in dietary patterns will assist with targeting public health initiatives by identifying subgroups most/least likely to change and those most/least likely to sustain a change.

1. Conflict of Interest: Non Disclosed
2. Funding: This work was supported by the HRB Centre for Health and Diet Research and funded by the Irish Health Research Board (HRC 2007/13)

T3:RS1 – Educate and Communicate

T3:RS1.1
Labelling: Helping the consumer recognise healthier foods
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Nutrition information on food labels is given in various formats throughout the world. The formats range from detailed information given on the back of the label to a simplified message, a symbol or a nutrition summary on the front of the package.

Nutrition labels are an important part of a supportive environment that encourages consumers to make healthier food choices. However, awareness and use of information in shopping situations may vary by sex, age and education. It is argued that labels are most helpful to consumers who are motivated to eat healthier. Interest in healthy eating is strongly associated with use of nutrition information in the store. On another hand, simple attractive labels may help those who are not that interested in reading nutrition information. Therefore, improving ease of use and understanding of labels are precondition for successfully using these measures to promote healthier food habits. Furthermore, labelling does not work by itself but needs to be put into a broader approach in nutrition education. Labelling represents a valuable tool to help consumers make informed decisions about their diet, yet insights into how labelling information affects consumers’ dietary patterns are limited.

The objective of nutrition labels is to make healthy choices easy for consumers. This is not, however, the only objective but labelling aims to stimulate healthy food product innovation and reformulation. Both consumer awareness of labelling and the set criteria for different symbols may drive food industry to reformulate and develop new products with a healthier product composition.

T3:RS1.3
8700 kJ – a community education campaign to support kilojoule labelling
Vinburg J1, Moroney C2, Kitchener S2, Szabo L1, Jansson E3, Mitchell J4, Eden B5, Caterson IP
1NSW Food Authority, Sydney, Australia, 2NSW Ministry of Health, Sydney, Australia, 3National Heart Foundation of Australia, Sydney, Australia, 4Boden Institute of Obesity, Nutrition, Exercise & Eating Disorders, Sydney Medical School, Sydney, Australia

Introduction: Kilojoule (kJ) labelling and signage (based on average Australian adult daily intake of 8700 kJ) is compulsory in food outlets such as fast food chains in New South Wales. A literature search identified that labelling in other jurisdictions had limited effectiveness without a supporting consumer education campaign. This study reports on the design, implementation and results of such a campaign.

Methods: A baseline study measured the pre-existing level of awareness of kJ and any relationship to food choices, followed by two waves of online surveys and store intercepts to measure the impact of the labelling regime and supporting campaign.

The campaign used a mix of social media, advertising, public relations and industry engagement, recognised by four major awards in public relations, advertising and smartphone App disciplines.

Results: Improved awareness of average daily kJ intake (up 14 percentage points); increased levels of noticing nutritional information in outlets (up 21 percentage points); decreased kJ purchase (down 441 kJ); and 60% spontaneous recall of campaign by target audience, which was perceived as informative, believable, relevant and necessary.

Conclusion: The case study and survey findings provide evidence of how an appropriate education campaign can positively contribute to the effectiveness of a kJ labelling program.

1. Conflict of Interest: None
2. Funding: All funding provided by NSW Government.

T3:RS1.4
Galician Plan to Boost Physical Activity Galicia Saudable 2011–2015 (Strategic Alliance 2020)
Leto Lasa Jose Ramón
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The Galicia Saudable is an initiative of the Galician Government, passed by the Galician Parliament on 27/12/2011. With a comprehensive and inter-departmental approach, it has a prime objective: to create the necessary conditions for the Galician population to enjoy a more active life, which will permit to take care of our health and preserve our personal autonomy, enjoy a better quality of life and welfare and foresee and reduce the existence of diseases linked to sedentary lifestyles (obesity, NCD, some types of cancer).

Galicia presents the following data concerning obesity (2006 National Health Survey): 24.97% of children and adolescents suffer from excess weight (19.81 are overweight and 5.16% are obese), 54.90% of Galician people older than 18 are either overweight or obese (38.03 / 16.87) and 60.00% 54.90% of Galician people older than 18 are either overweight or obese (38.03 / 16.87) and there are no specific data regarding the Galician population older than 65, although in Spain, 69.09% of the population suffers from excess weight (23.04% obesity and 46.05% overweight).

The Plan includes 156 measures and 7 areas of action: local, free time and sports; education, work, health, elderly and urbanism, the environment and mobility (in the educational area, 367 primary and secondary schools are developing projects to fight against sedentary lifestyles, obesity and insufficient physical activity). Nowadays, the Plan is sup-
It is over twenty years since epidemiological studies revealed that there was a relationship between poor fetal growth and subsequent risk of developing diseases such as type 2 diabetes, cardiovascular disease and metabolic syndrome. The detrimental effects of being born small for gestational age are exaggerated by accelerated postnatal growth. In terms of obesity, rapid postnatal growth, independent of growth in utero increases risk of gaining excess weight and central adiposity. Studies of identical twins, individuals who were in utero during periods of famine, randomized neonatal nutrition and animal models have provided strong evidence that the early environment plays an important role in mediating these relationships. The concept of early life programming is therefore widely accepted. However the mechanisms underlying such processed remain poorly defined. However emerging common underlying mechanisms include: (1) Permanent structural changes in an organ due to exposure to suboptimal levels of essential hormones or nutrients during critical periods of development. (2) Persistent alterations in epigenetic modifications such as DNA methylation and histone modifications leading to changes in gene expression. Transcription factors appear to be key targets of such epigenetic changes. (3) Permanent effects on regulation of cellular ageing through increases in oxidative stress and mitochondrial dysfunction leading to DNA damage and telomere shortening. Further understanding of these processes will enable the development of preventative and intervention strategies to combat the burden of common diseases such as type 2 diabetes, obesity and the metabolic syndrome.

Conflict of Interest: None Disclosed

T1:RS2.2 Enhancing energy expenditure during postnatal development with reduced ambient temperature
Kozak L

Disruption of energy balance by under-nutrition during early post-natal growth has been shown to affect the long term development of adipose tissue and susceptibility to diet-induced obesity. We previously showed that under-nutrition between birth and weaning suppressed the development of the capacity for adipose tissue expansion (ATE), involving a set of genes encoding proteins associated with the cytoskeleton and caveolae structure. The impact of early nutrition on ATE has long-term effects independent of the genetic background.

Introduction: Epigenetics, considered to be in the interface between genes and environment, is an ideal approach to unravel the complex etiology of obesity and related co-morbidities. Monozygotic (MZ) twins discordant for obesity, completely matched for DNA sequence, allow studying epigenetic changes induced by acquired obesity and lifestyle independent of the genetic background.

Methods: Rare young adult MZ twin pairs discordant for obesity (n=25, within-pair difference in BMI ≥ 3 kg/m²) identified from 10 full birth cohorts of 22-32-year-old Finnish twins, were examined for whole genome-scale DNA methylation patterns (Infinium HumanMethylation 450 BeadChip, Illumina) in blood and adipose tissue. Detailed metabolic characterization of the subjects included oral glucose tolerance test, inflammatory markers (hsCRP) and measurements of overall and regional adiposity (DEXA, MRI, MR spectroscopy).

Results: Comparisons of obese and lean co-twins revealed that unhealthy obesity with high liver fat, insulin resistance and inflammation was associated with consistent methylation changes in genes clustering to nutritional (vitamin, lipid and amino acid metabolism) pathways in blood and in pathways depicting cellular destruction and mitochondrial dysfunction in adipose tissue. No significant methylation alterations were associated with healthy obesity.

Conclusion: Epigenetic biomarkers are able to detect early metabolic abnormalities in obesity and suggest novel therapeutic targets for prevention and treatment of the deranged pathways.

Conflict of Interest: None Disclosed

T1:RS2.3 Epigenetic signature of obesity: A study in monzygotic obesity-discordant twin pairs
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Introduction: Epigenetics, considered to be in the interface between genes and environment, is an ideal approach to unravel the complex etiology of obesity and related co-morbidities. Monozygotic (MZ) twins discordant for obesity, completely matched for DNA sequence, allow studying epigenetic changes induced by acquired obesity and lifestyle independent of the genetic background.

Methods: Rare young adult MZ twin pairs discordant for obesity (n=25, within-pair difference in BMI ≥ 3 kg/m²) identified from 10 full birth cohorts of 22-32-year-old Finnish twins, were examined for whole genome-scale DNA methylation patterns (Infinium HumanMethylation 450 BeadChip, Illumina) in blood and adipose tissue. Detailed metabolic characterization of the subjects included oral glucose tolerance test, inflammatory markers (hsCRP) and measurements of overall and regional adiposity (DEXA, MRI, MR spectroscopy).

Results: Comparisons of obese and lean co-twins revealed that unhealthy obesity with high liver fat, insulin resistance and inflammation was associated with consistent methylation changes in genes clustering to nutritional (vitamin, lipid and amino acid metabolism) pathways in blood and in pathways depicting cellular destruction and mitochondrial dysfunction in adipose tissue. No significant methylation alterations were associated with healthy obesity.

Conclusion: Epigenetic biomarkers are able to detect early metabolic abnormalities in obesity and suggest novel therapeutic targets for prevention and treatment of the deranged pathways.

Conflict of Interest: None Disclosed

T1:RS2.4 Gut permeability responses to high fat diets and various stressors in adulthood are modulated by early probiotic administration
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Introduction: High fat (HF) diet alters gut microbiota and gut permeability, resulting in inflammation and obesity in mice. Fat absorption activates intestinal mast cells. Gut microbiota may be involved in early metabolic programming of obesity. Neonatal probiotic administration might be an option for decreasing obesity risk. Offspring born to sows treated with antibiotics around parturition display long-term permeability disorders. We tested the hypothesis that early probiotic administration to offspring born to antibiotic-treated sows may alleviate permeability disorders in adulthood in diet- and stressor-dependent manners.

Methods: Twenty sows received amoxicillin around parturition. Offspring received orally a probiotic (PROB, Lactobacillus amylovorus

Conflict of Interest: None Disclosed

Funding: Research relating to this abstract was funded by Novo Nordisk Foundation, Sigrid Juselius Foundation, Finnish Diabetes Research Foundation and Finnish Foundation for Cardiovascular Research, as well as the Academy of Finland, and Helsinki University Central Hospital grants.
DSM16698; 10 litters) or saline (10 litters) nine times between birth and d21. All pigs were reared similarly until d141 when groups were split into halves receiving either low fat (LF) or HF diet for 28 days. Gut tissues were mounted in Ussing chambers [treatments: basal, oxidative stress (OS), mast cell degranulation MCD)]. Mucosal paracellular (PCP) and transcellular (TCP) permeabilities were measured.

**Results:** Basal permeability remained unaffected. Ileum (not colon) from PROB pigs fed LF had reduced PCP in OX (P<0.05) and MCD (P<0.10) conditions. Ileal TCP after MCD was higher in PROB pigs with LF and HF (P<0.01). An interaction (P<0.10) between early PROB and adult diet was observed for TCP after OX. Colonic TCP was higher after OX and MCD in PROB-LF pigs (P<0.05).

**Conclusion:** Early probiotic administration can modulate gut permeability in a complex way that depends on gut site, diet composition and type of stressor in adulthood.

1. **Conflict of Interest:** None disclosed
2. **Funding:** Work supported by the EU (Interplay project No. 227549) and INRA France

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**T2:RS4 – Behaviour Change in Practice: Population and Individual Approaches to Changing Diet and Lifestyle**

**T2:RS4.1 Built environment and obesity prevention: the need for a holistic and comprehensive approach of the individual and its environment**

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In the last decades, the limits of educational or motivational obesity prevention programs targeting individuals have been acknowledged. Because it is nowadays recognized that obesity prevention needs to take into account the environment (physical, social, cultural, economic and policy) in which individuals live, there has been increasing interest in identifying the built environment characteristics that might be associated with, and play a role in individual’s activity levels and food choices. In the recent years, due to the availability of new technologies (e.g. geographic information systems, accelerometers), the assessment of built environment – human-made surroundings for living, including structures, infrastructures and spaces (e.g. buildings, transportation systems, park facilities) – in relation to individual behaviors has greatly improved, leading to an exploding number of publications. While data relating some built environment attributes to physical activity patterns, to food choices and to the risk of obesity are intriguing and suggestive, they are mostly observational and inconsistent, so that no clear conclusion about any causal relationship can be drawn. This presentation will summarize existing evidence, with a focus on the less explored question of how and why the built environment might influence health behaviors. It will emphasize that built environment is only one element of the complex dynamic interplay that exists between the different components of the multilevel socio-ecological models of behaviors and health, and that holistic programs targeting individuals and their living environment are necessary to obtain lifelong behavior changes. The need for transdisciplinary research, program planning, and evaluation to understand if and how findings can be translated in public health policies will be highlighted.

1. **Conflict of Interest:** None disclosed
2. **Funding:** Research relating to this abstract was partly funded through regular contributions from OECD member countries. Additional voluntary contributions to the project were made by the following member countries: Australia, Denmark, Mexico, Netherlands, Sweden and Switzerland. The project is also partly supported.

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**T2:RS4.2 Assessing the health and economic impact of fiscal measures**

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**Introduction:** Several OECD countries have introduced taxes on unhealthy foods and beverages as part of their efforts to counter obesity. Taxes can improve health by changing eating habits and, at the same time, they may generate important revenues, which has contributed to governments’ interest in these measures at a time of tight fiscal constraints.

**Methods:** The core component of the OECD-WHO analysis is a microsimulation model designed to reproduce the epidemiological dynamics of west-central Europe. The model accounts for three groups of chronic diseases: stroke, myocardial infarction and cancer, and related risk factors: diet and physical activity; body mass; high cholesterol, high blood pressure, and diabetes.

**Results:** A fiscal policy increasing the price of food rich in fat and decreasing the price of fruit and vegetables increases both life expectancy and disability-adjusted life expectancy by generating a gain of 1 additional life year/DALY every 31/25 persons. This policy is potentially cost-saving, with reductions in health expenditure which more than offset implementation costs. It may also lead to favourable effects on health inequalities, but it may generate an undesirable impact on income distribution.

**Conclusion:** Fiscal policies may play an important role in a comprehensive prevention strategy to tackle NCDs. Design and implementation of the policy are key issues. A well designed tax should cover all possible substitute foods, while revenues from the tax could potentially be used to attenuate any regressive impact or to increase the public health effects of the tax (e.g. by coupling it with subsidies on healthy foods).

1. **Conflict of Interest:** None disclosed
2. **Funding:** Research relating to this abstract was partly funded through regular contributions from OECD member countries. Additional voluntary contributions to the project were made by the following member countries: Australia, Denmark, Mexico, Netherlands, Sweden and Switzerland. The project is also partly supported.

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**T2:RS4.3 A systematic review of self-regulation mediators of success in obesity interventions: The SPOTLIGHT project**

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**Introduction:** Relapse is high in obesity interventions that involve behavior and weight change. Identifying mediators of behavior change in lifestyle obesity interventions is critical to improve their effectiveness, and more broadly to guide resource allocation in obesity treatment and prevention. This review will evaluate motivation and self-regulation factors that mediate medium/long-term weight change, physical activity, and energy intake in clinical and community behavior change obesity interventions.

**Methods:** Studies were identified through electronic database searches (e.g., MEDLINE, PsychINFO). Experimental or quasi-experimental studies, published since 2000, were eligible if they reported intervention...
effects on hypothesized mediators (e.g., self-determination, self-efficacy) and the association between these and outcomes of interest (weight change, physical activity, energy intake) in overweight/obese adults (19-65 yr). Quality and content of selected studies will be analyzed, and findings tabulated.

Results: The electronic database search yielded 193 potentially relevant papers, excluding duplicates. Studies were initially screened based on the title/abstract and 57 articles were selected for a full read. Of these, 28 met the eligibility criteria. Data extraction from relevant studies is expected to end in January 2013. Outcomes will be analyzed separately. Conclusions will be drawn based on a narrative synthesis of self-regulation mediators.

Conclusion: Systematically summarizing relevant information on self-regulatory processes and psychological mediators of change in obesity-related behaviors in overweight or obese individuals can improve interventions’ design, save limited resources, and increase rates of sustained change in desired outcomes. Moreover, it can offer insights into mechanisms originally responsible for the etiology (and persistence) of obesity.

1. Conflict of Interest: None Disclosed
2. Funding: Research relating to this abstract was funded by the Seventh Framework Programme (CORDIS FP7) of the European Commission (FP7-HEALTH-2011).

T2:RS4.4
Private sector actions to tackle obesity: The public health responsibility deal food network in England
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International bodies recognise the potential value of public-private partnerships to deliver improvements in public health in ways which go beyond traditional policy instruments. The Public Health Responsibility Deal Food Network was launched in England in 2011 (www.responsibilitydeal@dh.gov.uk) as a new approach to bring industry, NGOs and public health groups together with policymakers to agree voluntary actions to encourage and enable consumers to choose a healthier diet.

Two pledges are directly related to obesity. In 2011 a standardised scheme for calorie labeling on menus was launched. Forty-five businesses have committed to calorie labeling at point-of-choice representing 71% of fast food and takeaway meals and more than a third of all meals and takeaways sold on the high street. This provides consumers with the information to make healthier choices and acts as an incentive to businesses to consider the calorie content of the food they offer and in some cases to reformulate or introduce new, lower calorie menu items.

In March 2012 a specific calorie reduction pledge was launched and 23 companies across the food industry committed to a range of company-specific actions including reformulation to reduce the calorie content of food and drink, introducing new calorie-reduced ranges, portion control on energy-dense items, or incentive schemes to encourage consumers to make lower-calorie choices. Companies must also commit to report on their progress annually and this presentation will consider the progress so far, together with the challenge and opportunities that PPPs present.

1. Conflict of Interest: None
2. Funding: None

T5:RS2 – Delivery of Care – Who Should Provide and Deliver Weight Loss Programmes

T5:RS2.1
Comprehensive obesity management should be delivered through the multilevel obesity management network
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The long-term effects of obesity management (OM), except for bariatric surgery, have been unsatisfactory. The following most important barriers, in addition to the current obesigenic environment, that prevent efficient OM were reported: number of patients who should be addressed, poor knowledge about obesity among health care providers, lack of reimbursement, limited time during office visit, missing efficient anti-obesity drugs on the market, and unrealistic expectations concerning weight loss among obese patients who are exposed to advertisement on “miracle” treatment solutions. Our major goal is to persuade the whole society incl. health care providers, health policy makers and patients, that obesity represents different pathogenetic entities with serious health consequences and with important hereditary components and should therefore be perceived and treated as any other complex disease (e.g. hypertension) and not just as a lifestyle disease. To provide an appropriate care of obese patients comprehensive multilevel OM network should be implemented. Weight reduction clubs (non profit and commercial) and self-help groups, led by educated counselors should address overweight subjects and patients with uncomplicated obesity. OM network within the health care system takes care of severely obese patients and those with serious health risks and includes OM centres with affiliated bariatric surgical units, obesity specialists, other specialists (physicians, psychologists, dietitians, exercise physiologists etc.) and primary care physicians. OM centres should educate certified obesity specialists who, as representatives of a new medical discipline, implement an evidence-based holistic approach in the diagnosis and treatment of both obesity and its comorbidities and thus ensure e.g. appropriate indications for bariatric surgery, administration of novel antiobesity drugs and VLED.

1. Conflict of Interest: None Disclosed
2. Funding: Partly funded by the project of the Ministry of Health (CR) 00023761

T5:RS2.2
Commercial weight loss programmes offer the most effective management
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Introduction: In many European countries most of the population would improve their health by weight loss and many people try to lose weight. Following a behavioural weight loss programme would lead to greater weight loss but such programmes need to be delivered on a large scale to affect population prevalence. Only primary care teams or already widely available programmes delivered by commercial companies could achieve public health gains through obesity treatment but the relative effectiveness is unknown.

Methods: The talk will draw upon a trial that compared the effectiveness of commercial programmes to control and to treatment provided by general practitioners and nurses trained in weight management. It will also draw upon data from similar studies in which participants were randomised to either commercial programmes or control or randomised to be treated by trained generalists or control.

Results: In the three-arm trial, weight loss achieved by participants randomised to treatment by generalists was the same as that achieved by the no intervention control but the commercial programmes were clearly effective. This mirrors the data from other trials that randomised partic-
participants to a commercial programme or a control and to treatment by generalists or control. Treatment by generalists produced little difference in weight loss at 12 months, whereas the difference was about 2 kg with treatment in commercial programmes.

**Conclusions:** In the three-arm trial, weight loss achieved by participants randomised to treatment by generalists was the same as that achieved by the no intervention control but the commercial programmes were clearly effective. This mirrors the data from other trials that randomised participants to a commercial programme or a control and to treatment by generalists or control. Treatment by generalists produced little difference in weight loss at 12 months, whereas the difference was about 2 kg with treatment in commercial programmes.

**T5:RS2.3**

**Efficacy of self-managed body weight reduction with and without internet support**

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**Introduction:** Internet-based weight loss programs can be an operative low-threshold strategy to counteract increasing prevalence of overweight/obesity. This controlled trial investigated whether usage of KiloCoach™, an Austrian/German program, is more efficient in inducing weight loss and health effects compared to self-managed weight reduction without online support.

**Methods:** Based on a sample size calculation, allowing a dropout of 30%, 84 subjects (50% male) were included. 42 used KiloCoach™ over 6 months (45.6±10.1yrs, 31.4±3.1 kg/m²). 42 controls (47.6±8.2yrs, 31.6±3.8 kg/m²) tried to reduce weight without professional help. 61 subjects (47.5±8.9yrs, 31.7±3.6 kg/m²) completed study visits at baseline, after 1, 3 and 6 months, where anthropometric data, blood pressure, biochemical parameters and weight related quality of life (QoL) were assessed.

**Results:** Body weight reduction after 6 months was 6.6±5.5% for KiloCoach and 3.1±3.9% in controls (p=0.005). Reduction of waist circumference was significantly higher after intervention (7.8±6.5 vs. 4.5±4.8 cm, p=0.025). Decrease in waist:hip-ratio showed no group differences (p=0.732). Blood pressure reduction was significantly greater in KiloCoach than in controls (syst: 16.5±15.1 vs. 6.2±15.6 mmHg; diast: 11±10.6 vs. 5.5±9.4 mmHg, p<0.05). Serum LDL cholesterol significantly decreased in KiloCoach (p=0.001). No significant changes in LDL cholesterol arose in controls (p=0.097) or between both groups (p=0.173). QoL showed trends for greater improvement in KiloCoach compared to controls (p=0.06).

**Conclusion:** As KiloCoach™ usage induced a medically relevant weight loss and improved cardiovascular risk factors more efficiently than unsupported weight loss it seems to be a promising tool to improve health in broad public.

**T5:RS2.4**

**An examination of the effects of demographics and starting BMI on weight loss at the Rotherham Institute for Obesity**

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**Introduction:** The Rotherham Institute for Obesity (RIO) is the most comprehensive NHS-funded specialist intervention for weight management, based in the primary care setting, in the UK. It forms part of the award-winning NHS Rotherham Healthy Weights Framework, and provides a multi-disciplinary team approach. Adult patient numbers at RIO are now considered to be sufficient to provide good analysis of whether demographic factors influence success at weight loss.

**Methods:** A service evaluation was carried out on retrospective data collected on all patients beginning the RIO 6m programme, from the official launch in November 2009 to November 2011. Data including age, gender, postcode, employment status, and starting BMI was collected, and a index of multiple deprivation for each subject obtained.

**Results:** During the 2 year period analysed, 3538 patients were referred, and 1719 (49%) completed the programme. Of these 1033 (60%) reached their weight loss targets. Success/failure was independent of gender, employment status, deprivation index and starting BMI. Success/failure did appear to be dependent on age (P=0.034), with older patients appearing to be more successful (age category 70–79 yrs most successful).

**Conclusion:** It appears that apart from age, patient demographics have little effect on predicting success/failure rate for patients enrolled in the RIO programme. There may be a need to modify the programme to suit the lifestyles of younger generations, however, it is reassuring that all patients attending RIO appear to have an equal chance of losing weight assuming they remain motivated and engaged with the service.
T2:RS3 – Exercise and Activity: Cause or Consequence

T2:RS3.1 Are we a sedentary species? And why are we fat?
Blair S

Introduction: Over the past few decades, obesity prevalence has increased around the world. While the causes of this epidemic are complex and poorly understood, it is indisputable that persistent weight gain is caused by chronic positive energy imbalance via increases in caloric intake or decrements in energy expenditure or some combination of the two. Nevertheless, both the scientific literature and lay press focus primarily on energy intake as the cause of obesity while dismissing documented decrements in energy expenditure.

Methods: We evaluated trends in energy intake and expenditure from a variety of assessment methods for both diet and physical activity. Additionally, we considered the influence of increases in body size on energy expenditure, and expressed the data in kcal/kg/day, instead the typical approach of evaluating kcal/day.

Results: Data on dietary trends in the U.S. show that there may have been an increase in kcal/day over the past 40 years. However, when these data are adjusted for increases in body weight in the population, the increases in caloric intake are not sufficient to account for increases in resting metabolic rate and increases in routine daily activities caused by higher body weights. Other data show substantial declines in energy expenditure from multiple domains (e.g., occupational, transport, domestic activities).

Conclusion: To develop effective strategies to manage the obesity epidemic, we must focus our attention on both sides of the energy balance equation and not continue to diminish the importance of energy expenditure.

T2:RS3.2 Exercise in obese adults: Body weight loss, general health or both?
Ekelund U

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Obesity increases the risk of non-communicable diseases and mortality across sex, age and ethnic groups. Results from large scale observational studies suggest that higher levels of physical activity is protective against premature mortality across BMI and abdominal adiposity categories, although physical activity do not fully offset the increased risk of obesity on mortality. A weight loss of 5-10% of initial body weight has been observed, suggesting compensatory mechanisms by increasing exercise dose. In light of this, it is pertinent to ask whether there are additional health benefits of physical activity and exercise independent of body weight loss?

An emerging body of evidence from observational studies suggest that higher levels of baseline physical activity predict lower gain in abdominal adiposity independent of baseline general and abdominal adiposity. Higher levels of physical activity appear also associated with improved metabolic profile including insulin sensitivity independent of baseline adiposity. In line with this, controlled exercise training studies suggest improvements in cardio-vascular risk factors, visceral fat, abdominal adiposity, cardio-respiratory fitness and muscle mass independent of or with only minimal reductions in body weight. Health benefits can be achieved by increasing levels of physical activity independent of weight loss. A stronger emphasis on promoting physical activity rather than reducing body weight may have important public health implications.

T2:RS3.3 The Adaptive Metabolic Response to Exercise-Induced Weight Loss Influences both Energy Expenditure and Energy Intake
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Introduction: A decline in resting energy expenditure (REE) above that expected based on body composition changes has been noted following exercise-induced weight loss. However, it is unclear whether a compensatory down-regulation in REE also accompanies exercise-induced weight loss, or whether this metabolic adaptation influences energy intake (EI).

Methods: Thirty overweight and obese women (BMI=30.6±3.6 kg/m²) completed 12 weeks of supervised aerobic exercise (EX). Body composition, metabolism, EI, appetite and leptin were measured at baseline and post-intervention. The difference between predicted and measured REE was calculated post-intervention (MA), with REE predicted from a regression equation generated from a matched group of 66 overweight and obese women (BMI=31.0±3.9 kg/m²).

Results: REE remained stable during EX (+71.6±196.5 kcal/day; p=0.25), while mean values of predicted and measured REE did not differ post-intervention (-14.4 kcal/day; p=0.71). However, 43% of participants experienced a greater than expected decline in REE (-102.9±77.5 kcal/day). MA was associated with the change in leptin (-12.8±34.8%; p=0.47; p=0.04) and changes in resting fat (r = 0.52; p=0.01) and carbohydrate oxidation (r = 0.44; p=0.02) during EX. Furthermore, MA was associated with the change in EI (-131.0±297.0 kcal/day; r = 0.44; p=0.01) and fasting fullness (-17.0±23.6%; r = 0.43; p=0.02) during EX.

Conclusion: Marked individual variability existed in the metabolic response to exercise, with some individuals experiencing a greater than predicted decline in REE. Importantly, a compensatory down-regulation in REE was also accompanied by a commitment increase in EI, indicating that the adaptive metabolic response to exercise-induced weight loss influences both biological and behavioural components of energy balance.

T2:RS3.4 Heterogeneity in metabolic rate and substrate oxidation during standing vs sitting in young adults: Phenotyping according to magnitude and time-course
Miles-Chan JL, Saraflan D, Monteri JP, Schutz Y, Dulloo AG
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Mainstream media is now awash with reports that reducing sitting-time may decrease risk of disease and increase life-span. In the search for approaches to reduce sitting-time, research often compares sitting to a combination standing and ambulation, and what little research exists measuring the energetic cost of standing alone versus sitting is equivocal, with large variation in reported values (between no change and >20% increase during standing).

Our aim here was to determine the extent and time-course of changes in energy expenditure (EE) and respiratory quotient (RQ) during 10 min of
standing versus sitting comfortably, through min-by-min monitoring using a ventilated hood indirect calorimetry system adapted for measurements in different postures.

The present study, conducted in 22 young adults with normal BMI, reveals three distinct phenotypes based on the magnitude and time-course of the EE response to standing. One third of participants (8/22) showed little or no change in EE during standing relative to sitting (ΔEE <5%; below first quartile). Of the 14 responders (ΔEE 7-21%), 4 showed sustained, elevated EE during standing, while 10 responders decreased their EE to baseline sitting values during the second half of the standing period. These EE phenotypes were systematically mirrored by alterations in RQ (a proxy of substrate oxidation), with ΔEE inversely correlated with ΔRQ (r=0.6-0.8, p<0.01).

This study reveals distinct phenotypes pertaining to both the energy cost and fuel utilization in response to standing, and open new avenues for research into human variability in the energetics of standing and posture maintenance.

1. Conflict of Interest: None disclosed.
2. Funding: This study received no specific funding.

T3:RS2 – Intervention Programme Evaluation: Lessons Learned (and to be learned)

T3:RS2.1 Evidence-based good practice; intervention mapping
Kok G

Objectives: Conceptualise how to plan behaviour change programmes; use theory to guide the selection of determinants and methods; translate methods into practical applications.

Perspectives: participation approach, ecological approach, multi-theory approach.

Steps and Tasks: Conduct a needs assessment; formulate change objectives; select theory-based methods and practical strategies; develop the program; plan for implementation; plan for evaluation.

Practice: Examples of effective interventions developed by applying Intervention Mapping.

Conclusion: Applying Intervention Mapping to health promotion may help the development of more effective behaviour change interventions and may help in making a black box programme transparent to aid effective adoption and implementation.

Reference
Bartholomew, L. K., Parcel, G. S., Kok, G., Gottlieb, N. H., & Fernández, M.E., 2011. Planning health promotion programs; an Intervention Mapping approach, 3rd Ed. San Francisco, CA: Jossey-Bass.

1. Conflict of Interest: None
2. Funding: No funding

T3:RS2.2 Tower hamlets healthy borough programme: Evaluation of strategic and cultural impact
Trenchard-Mabere E

Introduction: Tower Hamlets Healthy Borough programme was one of nine ‘Healthy Towns’ across England funded to test and evaluate different approaches to making regular physical activity and healthy food choices easier for local communities. The aim was to learn more about how environmental factors can help to prevent overweight and obesity in children and families. The programme was based closely on the recommendations from the Foresight Report and was built around three themes: healthy environments, healthy organisations and healthy communities.

Methods: Evaluation was conducted at project and programme levels. The programme level evaluation was in two phases. Phase one involved document review and analysis, stakeholder interviews, a stakeholder workshop, participant observation and focus groups. Phase two used case studies to track the strategic and cultural influence of the programme within specific thematic areas.

Results: The programme level evaluation identified the following themes as critical success factors: building the programme on an evidence-based rationale, effective leadership at all levels, building on existing partnerships, linking to wider initiatives, using funding as a catalyst, building in ‘mainstreaming’ from the beginning, recognising the importance of community engagement and involvement, using high profile communications and branding to build a strong programme identity, fostering a learning culture and adapting in a changing policy environment.

Conclusion: The learning from this programme has increased our understanding of effective approaches to intervening in a complex adaptive system and is informing the next stage of our local strategy to tackle obesity in children and families.

1. Conflict of Interest: None
2. Funding: Funding for the Healthy Borough Programme, including the evaluation, was from the Healthy Communities Challenge Fund, provided by the Cross Government Obesity Unit (Department of Health and Department of Children, Schools and Families)

T3/T4:RS1 – Healthy Beginnings to Prevent Childhood Obesity

T3T4:RS1.1 Role of the mother and parenting practices
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Deakin University, Melbourne, Australia

Introduction: Establishing healthy eating habits early in life, is seen as one important strategy to combat childhood obesity. Given that mothers tend to be the primary caregivers of young children, understanding their influence on the child food supply and socialisation towards food, as their children develop adult-like food intake patterns and eating behaviours, is of importance.

Method: Over the last 5 years, I have developed a program of research focused on how parenting and mother-child interactions impact on preschool children’s eating habits and subsequent patterns of weight gain. This research is the first to adopt a dyadic perspective, taking into account the relationship between mother and child and how this may moderate or mediate the effect of parenting practices on preschool child weight gain; to my knowledge, this is the first prospective study to obtain rich observational data around home routines pertaining to preschoolers’ eating.

Results: In this presentation, I will summarise the findings of my longitudinal survey data, outline the detailed process of developing a coding process to evaluate mother-child interactions during home observations, and present findings of the relationships between maternal child feeding practices and the parenting, personal characteristics and psychopathology of mothers with preschoolers.

Conclusions: The role of maternal influences in the development of childhood obesity is complex. Information about the ways in which the parent and child can influence each other, as observed in parent-child interactions around food, is likely to provide greater insights into the aetiology of childhood obesity.
Breastfeeding and complementary feeding in prevention of later obesity

Michaelsen KF

Diet during the first two years of life affects the risk of later obesity. The protective effect of breastfeeding is discussed. A recent paper in NEJM (Casazza et al.) stated that one of seven false myths about obesity is that breastfeeding protects against obesity. Although the effect is not large, there seems to be a preventive effect of long duration of breastfeeding in obesogenic societies. Obese mothers have difficulties breastfeeding which complicates prevention of obesity and calls for increased support to these mothers. The protein content of infant formula, the alternative to breastfeeding, seems to be positively associated with the risk of developing obesity, reducing the protein content is considered, but the optimal content is not known. The low protein content in breast milk could be one of the reasons why breastfeeding seems to protect against obesity. A high protein intake during the complementary feeding period also seems to be associated with a higher risk of developing obesity. At the same time there seems to be no association between a high fat intake during the complementary feeding period and later obesity; a new study suggests that a low fat intake early in life could increase the risk of obesity in young adulthood. The first two years of life are a sensitive period with a programming effect on later health and there is evidence that optimizing diet during this period could play an important role in preventing obesity.

Child behaviour and weight outcomes of NOURISH RCT

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Introduction: The NOURISH RCT evaluated child eating behaviour and growth outcomes of an obesity prevention intervention that commenced in infancy and targeted maternal feeding practices.

Methods: 698 first-time mothers (mean age 30.1 years, SD=5.3) with healthy term infants (51% female) aged 4.3 months (SD=1.0) were enrolled at baseline. Mothers were randomly allocated to self-directed care or to attend two group education modules providing anticipatory guidance on early feeding practices. Outcomes were assessed six months after completion of the second module when the children were aged two years using validated questionnaires and 24-hour telephone recall. Z-scores (WHO) were calculated from measured child weight and height. Overweight/obesity was defined using International Obesity Task Force cut points. Australian and New Zealand Clinical Trials Registry Number 1260800056392.

Results: Retention at follow up was 78%. Intervention children showed lower levels of ‘obesogenic’ eating behaviours, food preferences and intake. No significant differences were noted in BMI Z-score. (Mean difference intervention-control -0.14, P=0.11) nor in prevalence of overweight/obesity (control 17.9% vs. intervention 13.8%, P=0.23).

Conclusion: Anticipatory guidance on protective feeding practices appears effective for increasing healthy child eating behaviours, food preferences and intake, which are postulated to reduce future obesity risk. These intervention effects did not translate into statistically significant differences in anthropometric outcomes at this age. However, the 4.1% point reduction in prevalence of overweight/obesity translated to a population-level effect would be important from a public health perspective. Follow up at 3.5 and 5 years is underway to evaluate longer term efficacy.

Conflict of Interest: None.

Funding: NOURISH was funded 2008-2010 by the Australian National Health and Medical Research Council (grant 426704). Additional funding was provided by HJ Heinz, Meat & Livestock Australia, Department of Health South Australia, Food Standards Australia New Zealand, Queensland University of Technology, and NHMRC Career Development Award 390136 (JMN).
T1:WS
Origin/s of ucp1-harbouring adipocytes
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Most of white and brown adipocytes, in spite of their well-known different functions, are contained together in visceral and subcutaneous depots in all mammals. Our data suggests that the reason for this anatomical mixture could reside in the fact that adipocytes have peculiar plastic properties allowing them to convert directly each other. Under chronic cold exposure white convert into brown to support the need for thermogenesis and under obesogenic diet brown convert into white to satisfy the need of energy storing. We recently showed that both white and brown adipocytes originate from endothelium of capillaries in adipose tissues. Differentiation imply a transformation of poorly differentiate cells that progressively, by definite structural steps, assume functional properties determining a specific phenotype. White and brown adipogenesis can occur in adipose organ of adult mammals under specific environmental requirements such as obesity (whitening) or cold adaptation (browning). The cytological modifications during whitening and browning of adipose organ are quite different from those of white or brown ontogenesis and suggest a direct conversion. Morphometric and BrdU data obtained from the analysis of most depots of adult adipose brown genesis and suggest a direct conversion. Morphometric and BrdU data obtained from the analysis of most depots of adult adipose brown genesis can occur in adipose organ of adult mammals under specific environmental requirements such as obesity (whitening) or cold adaptation (browning). The cytological modifications during whitening and browning of adipose organ are quite different from those of white or brown ontogenesis and suggest a direct conversion. Morphometric and BrdU data obtained from the analysis of most depots of adult adipose brown genesis and suggest a direct conversion.

1. Conflict of Interest: none
2. Funding: DIABAT FP7 HEALTH-F2-2011-278373

T1:RS3 – Inter Organ Talk
T1:RS3.1
Adipose tissue lipolysis and insulin sensitivity
Langin D

When energy is needed, white adipose tissue (WAT) provides fatty acids (FA) for use in peripheral tissues via stimulation of fat cell lipolysis. FA have been postulated to play a critical role in the development of obesity-induced insulin resistance. Whether and how chronic inhibition of fat mobilization from WAT modulates insulin sensitivity remains elusive. Hormone-sensitive lipase (HSL) participates in the breakdown of WAT triacylglycerol into FA. HSL haploinsufficiency and treatment with a HSL inhibitor result in improvement of insulin tolerance without impact on body weight and fat mass in high fat diet-fed mice. WAT inflammation is not modified. Blunted lipolytic capacity is associated with diminution in FA uptake and storage in peripheral tissues of obese HSL haploinsufficient mice. The reduction in FA turnover is accompanied by an improvement of glucose metabolism with increase of glucose uptake in WAT and skeletal muscle and, enhancement of de novo lipogenesis and insulin signalling in liver. In human adipocytes, HSL gene silencing leads to improved insulin-stimulated glucose uptake resulting in increased de novo lipogenesis and activation of cognate gene expression. In clinical studies, WAT lipolytic rate is positively and negatively correlated with indexes of insulin resistance and WAT de novo lipogenesis expression, respectively. In obese individuals, chronic inhibition of lipolysis results in induction of WAT de novo lipogenesis expression. Thus, reduction in WAT lipolysis reshapes FA fluxes with out increase of fat mass and improves glucose metabolism through cellular- autonomous induction of fat cell de novo lipogenesis which contributes to improved insulin sensitivity.

1. Conflict of Interest: None Disclosed

T1:RS3.2
Physiological studies of myokines and adipokines
Eckel J

Introduction: It is now accepted that adipose tissue is one of the major endocrine organs and both non-adipocytes and adipocytes contribute to the secretory output of adipose tissue. By releasing an unexpected diversity of signaling and mediator molecules, adipose tissue communicates with other tissues, such as liver, skeletal muscle, the heart, and vasculature. On the other hand, skeletal muscle releases myokines and the health promoting effects of physical activity may be related to this secretory function.

Methods: Conditioned media were collected from human adipocytes and myocytes. Contraction was evoked by electrical pulse stimulation. The secretome of these cells was characterized by a comprehensive proteomics approach.

Results: Using the proteomics approach and in vitro differentiated adipocytes, we identified 347 proteins, of which 263 were predicted to be secreted. Forty-four proteins were identified as novel adipokines and data will be presented regarding regulation and function of these novel adipokines. We additionally focused on the identification and characterisation of contraction regulated myokines and found 52 novel and 48 contraction-regulated myokines. It could be shown that the novel myokine YKL-40 protects skeletal muscle against TNF-zeta-induced pro-inflammatory signalling.

Conclusion: The myokine exhibits the same complexity as the adipokine, with a substantial overlap between these molecules. Specific myokines may exert an autocrine protective function.

T1:RS3.3
Vasocine effect of local noradrenaline on abdominal adipose tissue arterioles in diabetes
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Introduction. Expanding adipose tissue in obesity requires effective vascularisation to combat hypoxia and its consequences, such as insulin resistance and type 2 diabetes. The adipose tissue, especially the omental depots (OAT), synthesizes significant levels of vasconstrictive molecules, such as cytokines and catecholamines, compared to subcutaneous (SAT). The effect of these on adipose tissue arteriolar vasoreactivity is unclear.

Aims. The aims of this study were to investigate the noradrenaline (NA) mediated vasorelaxation of arterioles of the OAT compared to SAT, and, the effect of diabetes on this response.

Methods. SAT and OAT from obese non-diabetic and diabetic patients undergoing weight reducing surgery was used to investigate tissue NA content; tyrosine hydroxylase (TH) and endothelial markers. Arteriolar NA mediated vasorelaxation (10-9 -10-6 M) was assessed by wire myography.

Results. Arterioles from OAT showed higher maximal vasoconstriction (p=0.02), but, lower sensitivity to NA (10-8 - 10-7.5 M, p<0.05). NA concentration and TH immunoreactivity were significantly higher in OAT compared to SAT [SAT: 6.1(0.8-563.6) pg/mg, OAT: 534.8(2.2-2819.2) pg/mg; p=0.03]. However, in diabetics no significant depot differences were seen in NA synthesis or vasosconstriction. SAT arterioles from non-diabetics, showed significantly greater sensitivity to NA (10-8 M to 10-7.5 M, p<0.05).

Conflict of Interest: None Disclosed

Conflict of Interest: None Disclosed

2. Funding: Inserm, Fondation pour la Recherche Médicale, Région Midi-Pyrénées, GlaxoSmithKline, Inserm/DI4ON, CHU de Toulouse, Commission of the European Communities (Projects HEPADIP, ADAPT and DIABAT).
Conclusion. In conclusion, elevated, chronic, local NA synthesis in OAT of non-diabetic subjects may explain the reduced sensitivity to NA-induced vasoconstriction. Higher SAT NA synthesis in diabetes appears to abolish both the depot specific differences and sensitivity to NA.

T1:RS3.4 Muscle secreted exosomes: A new paradigm for muscle-pancreas cross talk?
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Introduction: Exosomes are nanovesicles derived from the late endosomal system which are released from cells constitutively. Recently, skeletal muscle secreted proteins have been shown to play important roles in intercellular communication. To determine whether exosomes would participate to this molecular dialog, we isolated and characterized mouse Quadriceps muscles. Proteomic analysis validated that Nanovesicles were characterized by diet (SD) or with SD enriched with 20% palmitate (HPD). Nanovesicles were isolated from HPD muscle, incubated with MIN6 cells to assess their effects on beta-cell function.

Methods: C57 Black6 mice were fed for 16 weeks with standard chow diet (SD) or with SD enriched with 20% palmitate (HPD). Nanovesicles released from control mice (SD) Quadriceps were characterized by proteomic, electron microscopy and western blot (WB). The miRNA content of SD and HPD nanovesicles from Quadriceps was determined by TLDA arrays. Beta cell MIN6 were incubated with 2µg of nanovesicles from SD or HPD muscles and insulin secretion was quantified by ELISA tests.

Results: HPD mice were insulin-resistant based on insulin tolerance tests and showed altered insulin-stimulated PKB phosphorylation in Gastrocnemius muscles. Proteomic analysis validated that Quadriceps-secreted nanovesicles have classical properties of exosomes and also contained specific muscle cell proteins. HPD muscles secreted less exosomes than SD (0.61µg+0.17 vs 0.30µg+0.06, p<0.05) and had a higher size (20% increase). Seven miRNAs were differentially expressed between HPD and SD muscle-secreted exosomes. Incubation of MIN6 with HPD exosomes lead to a twofold decrease of insulin secretion compared with SD exosomes.

Conclusion: During diet-induced insulin-resistance, myotubes release a new class of exosomes which participate to functional alterations of pancreatic beta-cells.

T2T3:WS1 The role of evidence in planning interventions
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Introduction: In a letter to the BMJ in 2008, Nicole Lavery asked: “How many studies into obesity does it take to build one cycle path for children to get to school on?” She went on to suggest “all research stops now” so public funds can be spent on action. Such dualist views are a sign of the gap that exists between hypothesis-driven obesity research and intervention implementation in practice. Using a childhood obesity treatment study as an example, this workshop considers how researchers can bridge this gap by adopting methodologies that are translational in nature.

Methods: A translational framework was applied to develop and evaluate a community-based childhood obesity treatment intervention (Getting Our Active Lifestyles Started (GOALS)) in partnership between academia, local health trusts and the local authority. A mixed-method design focused on continual improvement with a reciprocal cycle between evidence and practice.

Results: The intervention was refined in accordance with on-going evaluation, resulting in a significant year-on-year improvement in outcomes. Methodological challenges were faced in addressing the conflicting demands of research, public health and practical/ethical considerations.

Conclusion: There is an urgent need for research approaches that provide the “how to” information vital to implement interventions in practice. If we are to move forward in obesity management, both academic and public health communities must embrace methodologies that strive to translate evidence into feasible, sustainable and effective interventions.

1. Conflict of Interest: None
2. Funding: None
Non-alcoholic fatty liver disease (NAFLD) is a liver pathology with increasing prevalence due to the obesity epidemic. Hence, NAFLD represents a rising threat to public health. Currently, no effective treatments are available to treat NAFLD and its complications such as cirrhosis and liver cancer. Peroxisome proliferator-activated receptors (PPARs) are ligand-activated nuclear receptors which regulate lipid and glucose metabolism as well as inflammation. In this presentation, we will review recent findings on the pathophysiological role of PPARs in the different stages of NAFLD, from steatosis development to steatohepatitis and fibrosis, as well as the preclinical and clinical evidences for potential therapeutical use of PPAR agonists in the treatment of NAFLD. PPARs play a role in modulating hepatic triglyceride accumulation, a hallmark of the development of NAFLD. Moreover, PPARs may also influence the evolution of reversible steatosis towards irreversible, more advanced lesions. However, large controlled trials of long duration are needed to assess the long-term clinical benefits of PPAR agonists in humans.

1. Conflict of Interest: BS is consultant of Genfit.
2. Funding: No funding.

T1:RS4.2 Nutrition, inflammation and clinical outcomes

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Inflammation is a characteristic feature of many conditions and diseases. Irrespective of the trigger and the locus of activity, inflammation typically involves a common panel of cells and a common set of chemical mediators. It is now recognised that metabolic dysfunctions, like obesity, also include an inflammatory component. Adipose tissue releases a number of inflammatory mediators and circulating concentrations of such mediators increase with body mass index and are higher in obese than normal weight individuals. Furthermore weight loss, either through surgery or through lifestyle change is associated with decreased concentrations of inflammatory mediators in the bloodstream. Within adipose tissue both adipocytes and infiltrating inflammatory cells (mainly macrophages) seem to play roles in synthesis and secretion of inflammatory mediators. Some of these mediators, like TNF, can induce insulin resistance both locally and distally. Food components can influence inflammation in a variety of ways with some acting to promote inflammatory processes and others to dampen inflammatory processes. In general, healthy eating patterns and higher intakes of key components of such patterns are associated with lower inflammation. There is an increase in blood inflammatory markers following consumption of a meal especially one high in fat. This post-prandial inflammatory response is exaggerated with obesity and diabetes and can be modified according to the composition of the meal.

T1:RS4.3 Replacement of dietary saturated fat with monounsaturated fat protects against obesity-induced adipose tissue inflammation and hyperinsulinemia

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Introduction: Recent evidence indicates NLRP3-mediated processing of pro- to active IL-1β accentuates adipose tissue inflammation promoting insulin resistance (IR). Furthermore saturated fatty acids (SFA) but not monounsaturated fatty acids (MUFAs) can prime pro-IL-1β production. In this study we hypothesized that replacement of SFA for MUFAs in high-fat diets (HFD) would attenuate adipose inflammation through reduced priming of NLRP3 inflammasome and improve metabolic health despite development of obesity.

Methods: C57BL/6 mice were placed on a chow or HFD (45% palm oil/45% olive oil) for 24 weeks. Glucose (GTT) and insulin (ITT) tolerance tests were performed. Energy expenditure was monitored using TSE Phenomaster. Insulin secretion response to glucose challenge was quantified by ELISA. Macrophage recruitment into adipose tissue was measured by flow cytometry. IL-1β secretion from cultured adipocytes and stromal vascular fraction (SVF) stimulated ±ATP (100µm) was quantified by ELISA. Insulin-induced phosphorylated AKT in adipose tissue was determined by immunoblot analysis.

Results: A slight reduction in body-weight was observed in MUFAs-fed mice compared to SFA-fed mice concomitant with increased VO2 and heat production. MUFAs-fed mice were protected against obesity-induced hyperinsulinemia despite exhibiting comparable glucose homeostasis to SFA-fed mice by GTT and ITT. M1 adipose tissue macrophage number was lower in MUFAs-fed mice compared to SFA-fed mice. IL-1β cytokine secretion was lower from SVF of MUFAs-fed mice with a corresponding improvement in adipose tissue insulin sensitivity.

Conclusion: Dietary intake of MUFAs protects against obesity-induced hyperinsulinemia coincident with reduced adipose tissue NLRP3 activation and IL-1β release.

1. Conflict of Interest: None disclosed
2. Funding: Research Relating to this abstract was funded by Science Foundation Ireland

T2/T5:RS1 – Long Term Benefits of Weight Loss and Weight Maintenance in the Severely Obese

T2T5:RS1.1 A look at the lookahead trial

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The NIH sponsored LookAhead Trial tested whether a lifestyle intervention resulting in weight loss would reduce rates of heart disease, stroke, and cardiovascular-related deaths in overweight and obese people with type 2 diabetes. This was a randomized controlled trial conducted on 5145 persons in 16 centers in the USA. Half were randomly assigned to receive an intensive lifestyle intervention and the other half to a general program of diabetes support and education. Both groups received routine medical care from their own health care providers. The trial showed that the intervention could lead to weight loss and to maintenance of a significant amount of it over time. Participants in the intervention group lost an average of more than 8 percent of their initial weight after one year of intervention. They maintained an average weight loss of nearly 5 percent at four years. Participants in the diabetes support and education group lost about 1 percent of their initial weight after one and four years. There were important health benefits of the lifestyle intervention, including improved biomarkers of glucose and lipid control, decreasing...
sleep apnea, reduced need of diabetes medications, maintenance of physical mobility, and improved quality of life. However, the interventions did not reduce cardiovascular events. The NIH stopped the intervention arm on the recommendation of the DSMB, as it was found that the intensive lifestyle did no harm, but it did not decrease occurrence of cardiovascular events, the primary study goal. At the time, participants had been in the intervention for up to 11 years. Only published results of the trial will be presented.

T2T5:RS1.3
Just how important is emotional eating anyway? The changes in psychosocial functioning over two years in morbidly obese individuals following laparoscopic gastric banding surgery (LAGB)

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Introduction: In developed and developing countries there is an epidemic of obesity and Type 2 diabetes (T2DM) with the emergence of “diabesity”. It is known that T2DM and obesity compromise quality of life. Surgical treatment is regarded as the most effective means of achieving weight loss and normalising glucose tolerance in morbidly obese patients with T2DM. This study was undertaken to explore the long-term psychological impact of gastric banding on morbidly obese people, both with and without T2DM.

Methods: Fifty-three participants (41 female; 36 with T2DM; age range: 29-73 years; BMI 51.0±9.3 kg/m²) completed psychological scales measuring eating behaviour (DEBQ); general anxiety and depression (HADS); quality of life (WHOQoL-Bref); and social anxiety (DAS-24) at 5 time points: pre- (T1), six (T2), twelve (T3), eighteen (T4) & twenty-four months (T5) post-LAGB.

Results: Repeated measures ANOVA showed significant improvements across the five time points for BMI, weight, amount of weight lost & HbA1c (all p<.001); the psychological (p<.001), physical (p<.001) and environment (p<.007) subscales of the WHOQoL-Bref; the HADS anxiety (p<.015) and depression subscales (p<.001); and for social anxiety (DAS-24, p<.001). No main effects were recorded for diabetes or gender. No significant changes in eating habits (DEBQ) were noted at any point, the greater majority (70%) being emotional eaters.

Conclusion: These results suggest that LAGB improves BMI and psychological status irrespective of gender or diabetic status, and despite a lack of change in eating behaviour. Two years post-LAGB there is evidence that psychological health is still improving in parallel with physiological health.

T2T5:RS1.4
Metabolic changes during diet-induced weight loss and an ensuing long-term weight maintenance phase

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Introduction: The physiology of weight loss is insufficiently described, specifically the long-term effects. Here, we applied metabolomics analysis to detect human plasma metabolic changes during low-caloric diet (LCD) induced weight loss and an ensuing weight maintenance phase.

Methods: Metabolite concentrations in blood plasma were measured with gas chromatography/mass spectrometry (GC/MS) and combined with measurements of clinical markers. The measurements were performed in 12 human subjects at baseline (BMI 43±1.7 kg/m²), after LCD-induced weight loss (101±26 days; BMI 36±2.0 kg/m²) and after a period to maintain the reduced weight (167±37 days; BMI 36±1.9 kg/m²). All variables were analysed simultaneously with orthogonal partial least squares discriminant analysis (OPLS-DA) and principal component analysis (PCA) to find latent patterns among the variables.

Results: The concentration of 85% of the detected metabolites changed at some point during the program, and 58% remained altered in the long-term, i.e. after weight maintenance compared to baseline. Metabolite changes followed either an early profile parallel to improvement of insulin resistance and triglycerides, as exemplified by leucine, isoleucine and palmitic acid, or a late profile parallel to improvement of glucose tolerance and HDL cholesterol, as exemplified by ornithine.

Conclusion: Our data confirm and extend previous investigations of the metabolome of obesity and weight loss. Distinct early and late improvement profiles can be identified and these biomarkers may enhance our understanding of the mechanism behind the beneficial effects of weight loss and aid in the prediction of cardiometabolic risk and treatment efficiency.

1. Conflict of Interest: None
2. Funding: This review was supported by a grant from the Robert Wood Johnson Foundation to the African American Collaborative Obesity Research Network.

T3:RS3 – Inequality and Obesity

T3:RS3.1
Who is vulnerable?

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Introduction: Population groups that are vulnerable to above-average risk of obesity trigger special policy and environmental change considerations over and above those for populations at large. In this respect vulnerability is defined by ethical or ideological principles reflecting society’s obligations to protect children and foster equity for the socially, economically, and politically disadvantaged. In practice, vulnerability is identified by empirical data showing inequalities.

Methods: Data on differences in obesity prevalence by income, education, or ethnic minority status were reviewed for adults and children in selected high income countries. Pathways of vulnerability to high risk of obesity were assessed using a ‘community-energy balance’ framework.

Results: On theoretical and empirical grounds, inequalities in obesity affecting disadvantaged populations can be linked to past and present societal conditions and culture-structure interactions that predispose to calorie overconsumption and limit physical activity.

Conclusions: Population-based approaches for addressing obesity require focused evaluation of potential impacts on vulnerable populations along with identification of strategies that can close gaps.

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1. Conflict of Interest: None
2. Funding: This review was supported by a grant from the Robert Wood Johnson Foundation to the African American Collaborative Obesity Research Network.

T3:RS3.3
Are inequalities in child obesity widening?

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Introduction: The National Child Measurement Programme (NCMP) is an annual programme which measures the height and weight of over one million children in England in Reception (4–5 years) and Year 6 (10–11 years), with over 90% participation. The NCMP was set up in 2006 for
population surveillance of overweight and obesity in children; the data also facilitate epidemiological study of patterns in child growth.

Methods: The NCMP collects information on child ethnicity and place of residence. Six years of good quality data are now available (2006/07 to 2011/12) and these have been analysed in detail to examine how patterns of child obesity prevalence vary by demographic and socioeconomic group.

Results: Obesity prevalence has shown signs of a decrease for boys and remained stable for girls in Reception. Obesity prevalence among both boys and girls in Year 6 has increased year on year. Obesity prevalence among children who live in the most deprived areas of England is approximately twice that of children living in the least deprived areas and NCMP data suggest that these inequalities are widening.

Child obesity prevalence varies substantially between ethnic groups and by age and sex of children within ethnic groups.

Conclusions: The generally positive headline figures for the prevalence of child obesity mask a rather more mixed picture. In order to achieve a reduction in obesity prevalence among all children a particular focus on deprived populations and some ethnic groups may be required. This would help tackle persistent health inequalities.

1. Conflict of Interest: None Disclosed
2. Funding: No Funding

T3:RS3.4

Longitudinal study about differences in social capital between normal weight and overweight people with or without mobility disabilities in the Stockholm Public Health Cohort

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Background: Social capital is associated with health outcomes. People with mobility disability (MD) have risk to develop overweight and unhealthy behaviors. It is, however, unclear to what extent MD is associated with social capital. The objective of this study was to investigate social capital, among normal weight and overweight people with or without MD.

Methods: The cohort study is based on longitudinal self-reported data on 23,794 randomly selected individuals, from the general population of Stockholm County. Social capital was conceptualized as participation in society (activities and voting), and general trust (in the neighbourhood, health care, parliament and local politicians). We used information on MD and overweight status (BMI≥25 kg/m²) to create four sub-groups. Reference group was normal weight people without MD. The association between social capital and the exposure sub-groups was estimated by multivariate linear regression.

Results: Overweight people with MD had an increased risk of not participating in activities [RR=1.72 (95%CI: 1.37–2.17)] compared to the reference group. The participation in society increased over time in all groups, however, the gap in term of risk ratios remained constant over time. The pattern of general trust showed similar results, and the risk of lower trust was observed concerning politicians [RR=1.69 (95%CI: 1.28–2.22)], parliament [RR=1.72 (95%CI: 1.30–2.28)] and the health care system [RR=1.52 (95%CI: 1.10–2.10)] compared to reference.

Conclusions: Our results show that the studied concepts of social capital are lower among individuals with overweight and/or MD. Future intervention studies might therefore focus on improving social capital in these risk groups.