Beyond restriction and malabsorption. Identifying the molecular mechanisms for bariatric surgeries on obesity and diabetes

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While various bariatric surgeries provide both the largest and most durable weight loss of any currently available therapy, there remain great uncertainties around the mechanisms that produce such weight loss. At least some surgical approaches also reduce obesity-related comorbidities including type 2 diabetes and hyperlipidemia. These weight and metabolic successes put a premium on understanding how these surgeries exert their effects. We have been using a variety of mouse models to test specific hypotheses about key molecular targets that mediate the benefits of bariatric surgery. Bariatric surgery produces changes in a number of brain-gut signaling systems that result in profound changes in food intake and food selection. In addition to typical gut hormones, bariatric surgery results in changes in bile acids and bile acid signaling that are crucial for many of the behavioral and metabolic effects of the surgery. These insights make it possible to devise new treatment strategies that take advantage of the potent effects of these procedures but are less invasive and more scalable to tackle the obesity and diabetes epidemics.

Obesity prevention technologies

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Obesity is still not widely recognized as a social problem, it is still a number in experts’ charts and in sectorial advocates’ speeches for most societies worldwide. It takes time and a lot of work to conquer social recognition, and examples from climate change, pesticides use, smoking, and cruelty to animals and children, can help us understand how social recognition evolves. The expansion of the recognition of obesity by other sectors of society beyond those with expertise and interest in preventing obesity is critical because it is the main route to progress effective solutions, the how to, the technologies. In order to progress effective solutions besides counting with a social recognition of the problem, it is essential to embrace intellectual humbleness, recognize other sectors’ role and competencies and most importantly engage populations living in the problem and in the solution. Some solutions are obvious and evident for advocates, researchers and policy makers, but they face opposition from other interests. Indignation, desire to change, and perseverance are key to denaturalize the problem and progress the necessary changes. This will enable effective obesity prevention technologies to be implemented and succeed. Our goal is to reach that recognition and progress effective solutions before our societies reach very high rates of obesity or of any other harm. Regulations on labeling, marketing, school and other settings, and fiscal policies are examples of the solutions that should be put in place, but still require to be strengthened and expanded in scope and reach, and the ones setting the horizons that will move us forward are the social movements living the problems and the solutions required to strengthen, preserve and recover health promoting and sustainable food systems.

Personalised Medicine for obesity – possible or pipe-dream?

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Therapeutic approaches to treating obesity based on dietary modification and exercise have been, in general, unsuccessful. Pharmacotherapies for obesity, when coupled with lifestyle modification, can enhance weight loss, however there is individual variation in treatment response. An alternative strategy to a ‘one-size-fits-all’ approach to obesity management is ‘Personalised Medicine’, in which information about a person’s genes, environment and other characteristics are used to develop an individualized treatment plan to optimize results. To date, clinical trials have focused exclusively on genotype-tailored interventions for weight loss with varying success and results remain unclear1,2. Similarly, pharmacogenomics studies have been unable to accurately predict responders and non-responders to obesity pharmacotherapies3. This highlights the need for a whole systems approach in obesity, in which genomic analysis is combined with analysis of dynamic variables such as the proteome, metabolome and microbiome, thereby integrating both genetic background and response to the environment. A recent study by Zeve et al. reveals that extensive monitoring of a human cohort for variations in dietary intake, lifestyle, host phenotype, and the gut microbiome enabled the development of a machine-learning algorithm that accurately predicted the individual glycemic response to meals. This provides evidence that personalized intervention in obesity may be possible4.

Skeletal muscle secretory proteins: a link between regular physical activity and reduced disease risk in obesity?

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Almost 50 years ago Goldstein proposed the hypothesis that muscle cells possess a “humoral” component that contributes to the maintenance of glucose homeostasis during exercise. Approximately 15 years ago, we identified skeletal muscle as a cytokine-producing organ, demonstrating that the metabolic and physiological effects of exercise may be mediated by muscle derived humoral factors (for review see1,2). The number of myokines discovered by us and others continues to grow, but these have been discovered largely by serendipity. Inspired by the growing appreciation that many of these myokines might be proteins packaged in extracellular vesicles (EV), we have carried out a deep quantitative proteomic analysis of 1159 proteins contained in the EV fraction of plasma in 11 male participants carrying out 1 h of cycling. 325 proteins were differentially regulated by exercise with a notable upregulation of several classes of proteins that compose the canonical ~40-100 nm exosome. Pathway analysis revealed significant enrichments in a multitude of biological processes and signalling pathways. These data provide a novel mechanism by which newly released exosomes can influence tissue cross-talk and reveal an intriguing pathway by which exercise can exert multiple biological effects and possibly affect disease risk in the setting of obesity.


Developments in metabolic surgery: now and future

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Developments in metabolic surgery: now and future

Advances in surgical technologies: endoscopic horizons

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Advances in surgical technologies: endoscopic horizons

Modern understandings on mechanisms of surgery: mechanical or physiological?

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Modern understandings on mechanisms of surgery: mechanical or physiological?

Optimising surgical outcomes

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What do we know about long term outcomes & emerging complications

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Bariatric-metabolic interventions are intended to be durable yet we have very little quality data on long-term outcomes. Meanwhile, the surgical procedure development cycle is short, and largely unregulated, in contrast with that of pharmacotherapy. In addition, there is surgical optimism that tends to focus on the benefits of surgery and short-term procedural associated risks, but many of the potential long-term effects of surgery lie outside the surgical domain and present clinically elsewhere. The risks of long-term unexpected detrimental effects on health outcomes are high and largely unexplored. Emerging examples include nutritional, anatomical, and neuro-hormonal changes that are generated by surgical interventions and increase the risk of long-term complications. The focus for all patients should be healthy aging, but there are clear signals of neurological, bone, body composition, gastrointestinal, and mental health risks.

As bariatric-metabolic surgery evolves as a recommended therapy for many clinically severely obese patients we need to better understand the powerful mechanisms of action of surgery and reduce the off-target effects. In addition we need to provide appropriate clinical pathways that can identify and reduce the risk of adverse longer term events.

Patterns of surgery in Australia & the single anastomoses gastric bypass in Australia: Are we there yet?

**David Martin**

Patterns of surgery in Australia & the single anastomoses gastric bypass in Australia: Are we there yet? Or the new prince?

Bariatric Surgery in Asia Pacific - Shock & awe

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In the past, obesity was not considered as a major burden for Asian countries as the prevalence is less than 5%. Hence, even though the first bariatric surgery in Asia had taken place in Taiwan & Japan in 1974, the development of bariatric surgery is slow and not well received by the general surgeons and the publics at the 80s’. However, with the increasing prosperity and Westernization of people’s life, obesity has become an important health topic in Asia. Moreover, with the difference of biology in Asian patients, the prevalence of metabolic syndrome and type 2 diabetes is high at a relative lower BMI than western population. All these factors push the development metabolic and bariatric surgery in Asia in the last two decade. Currently >50% of diabetes patients in the world is located at South-east Asia and Western pacific countries, and the development of metabolic surgery will be focus in Asia-Pacific region in the future.

The laparoscopic era of bariatric surgery started in Taiwan when Prof WJ Lee performed the first laparoscopic vertical banded gastroplasty in1998. The wave of laparoscopic bariatric surgery comes when adjustable gastric band becomes the most popular operation in Australia in the early 2000’. Due to its simplicity with minimal morbidity, Asian countries start to take-up bariatric surgery. Surgeons in Asia received training from western countries like Australia, US and Brazil and start to develop bariatric surgery. Due to the close proximity of most Asian countries, knowledge and skill exchange rapidly among them. The first Asian Bariatric Surgery Group establish in 2004 and establish the Asian Gu...
The modern metabolic clinic - Interdisciplinary/multistage

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The number of bariatric surgical procedures performed has plateaued over the last few years in Europe and the USA. Even though bariatric surgery has been shown to be superior to medical therapy in terms of glycaemic control and weight reduction, non-surgical therapies are continually improving. The appropriate use of bariatric surgery remains a subject of debate, with many physicians in the field remaining sceptical about it, in view of the risks associated with surgery. Ultimately, surgery can be enhanced by the appropriate use of medication to give patients the best possible outcome as regards their obesity and type 2 diabetes (T2D).

A combination of therapies will be required to optimize the benefits of bariatric surgery, but will certainly be worthwhile in obese patients who are otherwise unable to achieve lasting health benefits. Ongoing head-to-head trials of surgical and surgery enhanced by medication are warranted to determine the best route to obesity management, and to identify the patient populations most likely to benefit from each strategy. Using the currently available treatment options we would suggest that the effect of bariatric surgery on reducing hepatic insulin resistance can be enhanced by adding metformin and the effect on blood pressure and glycaemic control can be enhanced by sodium glucose co-transporter 2 inhibitors. The major benefit of bariatric surgery is the weight loss maintenance and this may be enhanced by using high-protein low-glycaemic index (GI) diets more effectively in the future. Thus not only can most of the beneficial effects of bariatric surgery potentially be mimicked, but this may also be enhanced to achieved at a much reduced cost while improving morbidity and mortality.

Public bariatric surgery: Is a national framework possible? - summit outcomes

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In March 2017 OSSANZ held a National Public Bariatric Surgery Summit recognising that access to publically funded bariatrics was inequitable when compared with private access.

The summit aimed to explore barriers in access to public bariatric surgery and identify common themes, examine current services and identify strengths and weaknesses and ultimately determine what consensus could be achieved on a National Framework within which advocacy for increased services could be structured. The findings of the summit suggested an agreed national framework was possible with key defining points that must be addressed being:

- Referral pathways
- Selection / eligibility criteria
- Model of care with multidisciplinary preoperative work up & pre clinic education
- Data collection
- Guidelines for provision of revisional surgery

Broadly, the group felt the parameters of each element should be flexible to a degree to accommodate the specific circumstances of a given community / institution. However there was strong consensus that the following components be standardised:

- Selection and eligibility criteria
- Data collection with mandatory contribution to the National Bariatric Registry

The work will now be taken forward to an OSSANZ task force to develop the framework and begin advocacy strategies with government and hospital governance.

Measurement in community settings

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Community-based interventions provide a promising approach for the prevention of obesity, particularly among children. These interventions are hampered by the challenges of good quality data to support implementation, evaluation and continual improvement. The Global Obesity Centre (GLOBE) has a program of research at the intersection of evaluation, systems and implementation science and this paper describes our use of measurement within this approach to supporting obesity prevention in community settings.

Childhood obesity monitoring and use of routine data have shown to be very effective in supporting community engagement in childhood obesity prevention initiatives. Our current large-scale interventions have demonstrated comprehensive and low-cost data collection across a number of levels, including anthropometry, behavior, networks, systems and environmental and contextual data. The creation of monitoring within schools (collecting anthropometric and survey data from >18,000 Victorian school children in >250 primary and secondary schools) in several trials has demonstrated the feasibility of opt out consent. This approach provides high quality, high participation (>80% student participation rate) data which can support ongoing community efforts to mobilise and sustain interventions.

These data in turn are supported by measures of ‘systems’ characteristics including systems maps, social networks and community readiness to change. Systems maps help to capture the shared mental models of participants, making explicit their assumptions about how childhood obesity works in their community. Repeating systems mapping with participants over time can help qualitatively capture how participants’ understanding of childhood obesity evolves, which can then inform improved action based on ongoing learning.

Social networks in public health are critical for program development, implementation and community engagement. Analysis of community leadership networks gives us insight and understanding of the role that different network structures and composition influence obesity prevention efforts and outcomes over time.

Community-readiness to change is a tool to capture dimensions of the community’s readiness, willingness and resources available to address the issue of childhood obesity in their community. This presentation will discuss the use of measurement at the intersection of systems, implementation and evaluation science and the many questions this work poses for measurement in community settings. The model describes represents the next iteration in moves towards evidence-based, community owned childhood obesity prevention. Efforts are needed to formalize, embed and scale high quality, standardized methods for measurement, implementation, evaluation and constant adaptation of community change efforts.

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Understanding the limitations of dietary assessment methods and how they impact on reported dietary intake

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Accurately measuring what we eat and drink is difficult. Traditional methods of dietary assessment, such as 24-hour recall, have a high participant burden and are resource intensive. Shorter assessment instruments are usually less detailed, and while some quantitative accuracy is sacrificed, in certain situations they are an appropriate and appealing option. Technology is slowly being incorporated into existing dietary assessment tools, and new technologies may even change how we measure diet in the future.

The retrospective, self-reported nature of dietary assessment methods can introduce some degree of error or bias in terms of their accuracy to measure “true” intake. The delivery of 24-hour recalls (telephone/face-to-face) and the sampling framework (number of weekday/weekend days) of 24-hour recall surveys can also impact on what foods and beverages are reported. Removing the face-to-face element of traditional methods, and delivering surveys online, may allow data to be collected from larger samples. The CSIRO Healthy Diet Score Survey is freely available online and has been completed by over 200,000 Australians. A survey such as this provides useful information about reported food intake, however this application of technology does not usually overcome measurement biases. Short surveys tend to result in an overestimation of healthy foods and underestimation of discretionary foods. However, the anonymity of answering in an online environment can reduce misreporting associated with weight status – which is problematic in data collected by face-to-face recalls.

Advances in technology means new methods, such as using photography to capture intake instead of self-report or physiological measurements as a proxy to intake, may overcome some of these limitations. However, these applications are generally not ready for use in large population studies.

It is important to understand the limitations, and potential measurement error of dietary assessment methods, and how to deal with this error in analysis, or when working towards improving current methods to measure dietary intake.

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How and why we need to measure sugar in our diet

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How and why we need to measure sugar in our diet

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Mini Movers: a randomised controlled trial to reduce sedentary behaviour in 2- to 4-year-old children

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Background:
Sedentary behaviour (e.g., screen time, sitting) is associated with adiposity in children as young as 1 year of age. Yet young children spend large amounts of time in sedentary behaviour, suggesting the need for feasible, effective and scalable interventions. This study aimed to test the feasibility and efficacy of a parent-focused, predominantly mobile telephone-delivered intervention to decrease young children’s sedentary behaviour.

Methods:
Mini Movers was a pilot randomised controlled trial delivered to parents of 2- to 4-year-old children in Melbourne, Australia. The intervention was 6 weeks in duration and was predominantly delivered via personalised, interactive text messages promoting positive health behaviours (strategies for decreasing screen and sitting time), goal setting and self-monitoring. The primary outcome was intervention feasibility. Secondary outcomes were children’s parent-reported sedentary behaviours (screen time, time spent restrained and sitting time) and objectively assessed sitting time (activPAL™ accelerometers) measured pre- and post-intervention. Linear regression models were used to determine the effect of the intervention, controlling for child sex, age and clustering. Effect sizes (Cohen’s d) were calculated.

Results:
Fifty-seven participants (30 intervention; 27 wait-list control) were recruited at baseline. The intervention was feasible and acceptable; 50% of parents reported that the information overall was moderately/extremely useful, with 65% reporting that the text messages were moderately/extremely useful. Parent-reported screen time decreased significantly in the intervention group compared to the control group (adjusted mean difference -35.0, 95% CI -64.1, -5.9; d=0.92). A moderate effect was seen for parent-reported time spent restrained (d=0.48). Small effects were seen for parent-reported and objectively assessed sitting time (d=0.15 and d=0.26, respectively).

Conclusions:
Mini Movers was a feasible and potentially efficacious intervention to reduce sedentary behaviour in 2- to 4-year-old children. The use of mobile telephone technology is novel in this population and affords the potential for the intervention to be widely disseminated.

The cost of obesity and diabetes in Australia

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Introduction:
Excess body weight is strongly associated with the risk of diabetes. In Australia, the latest data suggests that 11 million adults have overweight or obesity and 1.2 million adults have diabetes. The respective costs of obesity and diabetes were estimated previously, but the cost associated with both obesity and diabetes combined have not been reported in Australia. The aim of the study was to assess and compare the total direct (healthcare plus non-healthcare) cost and government subsidies by body weight and diabetes status.

Methods:
The Australian Diabetes, Obesity and Lifestyle study collected health service utilisation and health related expenditure data at the 2011-12 follow-up survey. The World Health Organization body mass index cut-points were used to define normal weight, overweight and obesity. Participants with fasting plasma glucose ≥7.0 mmol/L, 2 hour plasma glucose ≥11.1 mmol/L, or self-reported having diabetes and on pharmacotherapy were considered to have diabetes. Costing data were available on 4409 participants aged ≥36 years in 2011. Unit costs for 2016-17 were used where available or were otherwise inflated to 2016-17 dollars. Age- and sex-adjusted costs per person were estimated using generalised linear models.

Results:
The annual total direct cost ranged from $1998 per person with normal weight to $2501 per person with obesity in participants without diabetes. For those with diabetes, total direct costs ranged from $2353 per person with normal weight to $3131 with obesity. Additional expenditure as government subsidies ranged from $5681 per person with normal weight and no diabetes to $8067 per person with obesity and diabetes.

Conclusion:
The annual total excess cost was 26% for obesity alone and 46% with the addition of diabetes. Lifestyle modification programs targeting people with excess body weight may reduce the risk of diabetes, thereby, reducing the financial burden for both individuals and the government.
Brown fat, more diet and lifestyle?
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Metabolic flexibility drives energy expenditure
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Metabolic flexibility, defined as an ability to switch oxidation between carbohydrate and fatty acids declines as body fatness increases. This is known as metabolic inflexibility. This is due in part to a decrease in insulin stimulated glucose oxidation after a meal but also a decline in fatty acid oxidation in the post-absorptive state. Metabolic flexibility improves with weight loss, exercise training, and certain pharmacological treatments.

In parallel, dynamical systems modeling has provided new insights that relatively small changes in energy expenditure accumulate to produce fat gain or loss. These changes, on the order of 50-100kcal / day are difficult to measure in free living humans. Recent technical and procedural advances in the application of high resolution indirect calorimetry now allow us to measure very small changes in substrate utilization and energy expenditure.

We will review recent work demonstrating that switching fuel supply from carbohydrates to fat increases energy expenditure in humans. This thermogenesis has been observed not only with large changes in fatty acid supply (i.e. Intralipid™ infusion and ketogenic diets) but also under pharmacological conditions where small changes in metabolic flexibility produce meaningful changes in nocturnal energy expenditure. In addition, preliminary data suggests that this effect plays a role in the early responses to calorie restriction / weight loss.

These early results are pushing us to devise new approaches to the treatment of obesity by enhancing metabolic flexibility and therefore nocturnal thermogenesis; however, the real value may be in the crafting of population level strategies to prevent weight gain.

The obesity phenome
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Obesity is an important risk factor for type 2 diabetes. Over the past 20 years clinicians and researchers described diverse phenotypes in individuals with obesity. A (yet debatable) proportion of individuals with obesity have been suggested to maintain a better metabolic profile with peripheral insulin sensitivity comparable to that measured in individuals in the normal weight range. Better glucose and lipid regulation in muscle, liver and adipose have been documented in obese individuals who maintain insulin sensitivity. However, recent large cohort longitudinal studies suggest that metabolic health in obesity is not sustained in older age. Using the gold-standard hyperinsulinaemic-euglycaemic clamp with glucose tracers, we found diverse phenotypes of muscle and liver insulin resistance in obesity. Some individuals were insulin-sensitive in both muscle and liver, some presented with dual organ insulin resistance, while some presented with mixed insulin resistance, being insulin-resistant in either muscle or liver while maintaining a relative insulin sensitivity in the other organ. I will present the key metabolic attributes of the different obesity phenotypes we identify at the Clinical Research Facility at the Garvan Institute of Medical Research and explore their metabolic fate over time.

Vitamin D supplementation has no effect on insulin sensitivity or secretion in vitamin D-deficient, overweight or obese adults: a randomized placebo-controlled trial.
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Background:
Vitamin D supplementation has been proposed as a potential strategy to prevent type 2 diabetes. However, existing clinical trials are limited by short durations, low doses of vitamin D, variability in participants’ vitamin D deficiency status, and use of surrogate measures of body composition, insulin sensitivity, and insulin secretion.

Objective:
We conducted a double-blind randomized placebo-controlled trial to investigate whether vitamin D supplementation, provided in a sufficient dose and duration to vitamin D-deficient individuals, would improve insulin sensitivity and/or secretion measured by gold-standard methods.

**Design:**
Sixty-five overweight or obese (BMI=25 kg/m²), vitamin D-deficient (25-hydroxyvitamin D (25(OH)D)≤50 nmol/L) adults were randomized to a bolus oral dose of 100,000 IU followed by 4,000 IU daily of cholecalciferol or matching placebo for 16 weeks. Before and after intervention, participants had gold-standard assessment of body composition (dual X-ray absorptiometry), insulin sensitivity (hyperinsulinemic-euglycemic clamps) and insulin secretion (intravenous glucose-tolerance tests). Additional measurements included BMI, waist-to-hip ratio, blood pressure, serum lipids (ELISA), and high-sensitivity C-reactive protein (highly-sensitive ELISA). All analyses were adjusted for multiple testing using Bonferroni-correction.

**Results:**
Fifty-four participants completed the study (35M/19F: age=31.9±8.5 years; BMI=30.9±4.4 kg/m² (mean±SD)). Serum 25(OH)D increased with vitamin D supplementation compared to placebo (57.0±21.3 versus 1.9±15.1 nmol/L, p=0.02). Vitamin D and placebo groups did not differ in change in insulin sensitivity (0.02±2.0 versus -0.03±2.8 mg/kg/min, p=0.9), total, first- or second-phase insulin secretion (all p>0.1), blood pressure, serum lipids, or hsCRP (all p>0.1). Results remained non-significant after adjustment for age, sex, and % body fat, and after additional adjustment for sun exposure, physical activity, and dietary vitamin D intake (p>0.1).

**Conclusions:**
Vitamin D supplementation does not improve insulin sensitivity or secretion in vitamin D-deficient, overweight or obese adults, despite using sufficient doses and robust endpoint measures. It is unlikely that vitamin D supplementation would be an effective strategy for reducing diabetes risk in this population.

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**Is bariatric surgery safe and effective for patients with super obesity?**

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**Background:**
Super obesity (BMI ≥ 50kg/m²) is becoming increasingly prevalent, but there is a dearth of literature on treatments for people with this degree of obesity as they are often excluded from clinical trials. While surgery is the most durable and effective treatment for obesity, there are some concerns over its safety and efficacy for people with super obesity. We aimed to assess the long-term safety and efficacy of bariatric surgery in this group.

**Methods:**
This is a longitudinal follow-up study of patients who underwent bariatric surgery as public patients from 2009-2017. Patients were classified as having obesity (BMI 30-49.9 kg/m²) or super obesity (BMI ≥ 50 kg/m²).

**Results:**
The mean pre-operative BMI±SD was 42.7±4.2 kg/m² in the obese group (n=85) and 58.9±7.5 kg/m² in the super obese group (n=48). There were no differences in age or sex of these patient groups (53.8±1.2 versus 49.9±1.6 years; and 34.1% versus 31.1% male). The main operation in both groups was sleeve gastrectomy (88% (n=75) versus 90% (n=43)). Substantial weight loss was achieved by patients in both groups at all time points, with no significant difference between groups in weight loss expressed as a per cent of pre-surgical weight. Weight loss (kg) in patients with obesity versus super obesity was 24% (28.9 kg, n=88) versus 26% (40.9 kg, n=36) at 1 year, 24% (29.2 kg, n=55) versus 29% (46.2 kg, n=32) at 2 years, 23% (27.4 kg, n=32) versus 25% (40.5 kg, n=13) at 3 years, 21% (25.7 kg, n=23) versus 23% (36.0 kg, n=10) at 4 years and 15% (18.4 kg, n=15) versus 18% (29.5 kg, n=8) at 5 years. There were no differences in complication rates between groups.

**Conclusion:**
Bariatric surgery appears to be equally safe and effective in patients with super obesity as in those with less severe obesity.

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**The myth of GLP-1 as a gut hormone: Implications for GLP-1-based therapies**

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The myth of GLP-1 as a gut hormone: Implications for GLP-1-based therapies
Using human tissue to understand the relevance of the gut endocrine system in obesity

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Gut endocrine cells (called enteroendocrine cells) are scattered amongst the gastrointestinal epithelium and collectively constitute the largest endocrine tissue in our body. They consist of an array of different cell types, each synthesising different peptide hormones. Many of these hormones have significant effects on metabolism, food intake and body weight. Our studies have focused on cells that release GLP-1, PYY and serotonin (5-HT). We have combined secretion studies using ex vivo tissue from human colon, ileum and duodenum with in vivo studies in lean, obese and type 2 diabetes individuals. Gut-derived 5-HT suppresses thermogenesis in mice and causes obesity. We have identified that gut-derived 5-HT increases in obese humans, and that gut 5-HT acts as a link between the gut microbiome and host obesity. GLP-1 is an incretin hormone and, along with PYY, can regulate central pathways associated with food intake. We have elucidated the pathway by which glucose triggers GLP-1 secretion in human small intestine and identified that the melanocortin pathway, typically associated with central pathways controlling food intake, also exists within the gut epithelium and activates GLP-1 and PYY secretion in human gut via the MC4 receptor. Metformin is the most widely prescribed diabetes drug in the world and has moderate effects in reducing body weight. Our combined clinical and ex vivo studies demonstrate that metformin triggers GLP-1 and PYY secretion in human gut, and that metformin-induced GLP-1 secretion is responsible for 75% of the glucose lowering effect of metformin. Such findings indicate that the mechanisms controlling peripheral gut hormone secretion have direct relevance to metabolic control and human obesity in a number of different ways.

The geometric framework for nutrition as a tool for precision medicine

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The Geometric Framework for Nutrition provides a unifying model for exploring the complex relationships between nutrition and health. Interactions between the nutritional environment, physiology and disease outcomes are mediated via appetite and metabolic control systems, with gut, liver and brain playing key roles. In this talk I will present some of the latest data from experiments in which these relationships have been explored using nutritional geometry in mice, flies and humans. I will introduce data on the double burden of branched chain amino acids, the role of macronutrient ratios in shaping the microbiome and on the regulation of protein appetite.

Shifting light cycles abrogates circadian rhythmicity of gastric vagal afferent satiety signalling.

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Gastric vagal afferents (GVAs) play an important role in the regulation of food intake [1]. GVAs exhibit circadian rhythmicity in response to mechanical stimuli allowing time of day specific satiety signalling [2]. Disruption of the circadian clock is associated with increased risk of obesity [3]. We aimed to investigate the effect of disrupting the light cycle on GVA satiety signalling in health and high fat diet (HFD)-induced obesity.

C57BL/6 male mice (8wks old) were fed a standard mouse chow (SLD; 14% energy from fat) or HFD (60% energy from fat) ad libitum for 12 weeks. After 4 weeks on the respective diets they were placed into 2 groups/diet: 1) maintained in a normal light cycle environment (NL-mice; lights on 0600 to 1800); and 2) exposed to a rotating light cycle (RL-mice; 3 days lights on 0600 to 1800; 4 days lights on 1800 to 0600) for 8wks. In vitro GVA recordings [4] were taken at 3 hour intervals starting at 1800.

The HFD-mice gained significantly more weight than SLD-mice and the HFD/RL mice gained significantly more weight than the HFD/NL mice (SLD/NL-mice: 8.19±0.2g; SLD/RL-mice: 9.01±0.2g; HFD/NL-mice: 20.63±0.6g; HFD/RL-mice: 22.49±0.6g). SLD/NL-mice exhibited circadian oscillations in GVA mechanosensitivity with peaks at 1200 and troughs at 0000hr. Consistent with these results, food intake was greater during the dark phase (2.59±0.1g) compared to the light phase (0.53±0.1g; P<0.001) in SLD/NL-mice. Circadian rhythmicity in GVA mechanosensitivity and food intake was lost in SLD/RL-, HFD/RL and HFD/NL-mice.

In conclusion, rotating the light cycle and/or HFD feeding abrogates circadian rhythmicity of GVA satiety signalling and alters feeding behaviour.

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Association of mTOR genetic variants with anthropometric traits in postmenopausal Chinese with type 2 diabetes: the Hong Kong Diabetes Registry

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Background:
mTOR pathway regulates energy homeostasis by integrating the hormonal and nutritional signals.1-3 Besides discordant results on the inter-relationship between obesity and menopause4, genetic data in Asian type 2 diabetes (T2D) populations are sparse. We aimed to examine the association of mTOR variants and anthropometric traits in postmenopausal Chinese with T2D.

Methods:
A total of 3168 Chinese women from Hong Kong Diabetes Registry recruited between 1994-2007 were genotyped for mTOR locus using the Illumina Omni 2.5+ exome array. 35 genotyped single nucleotide polymorphisms (SNPs) with minor allele frequency ≥0.01 were included. Associations of SNPs with baseline body mass index (BMI), waist circumference (WC) and waist-hip-ratio (WHR) were explored in an additive model, stratified by age with a cut-off at 50 years (age of menopause), adjusting for age, T2D duration and principal components of global ancestry.

Results:
Mean age (standard deviation) of the study cohort was 57.5±13.2 years. Median (inter-quartile range) T2D duration was 6 (2-12) years. Mean BMI and WC were 25.2±4.1 kg/m2 and 83.5±9.9 cm, respectively. For rs4845988 near mTOR, postmenopausal women (age ≥50 years) had significantly higher WC (betaWC 0.699, P=0.037) and WHR (betaWHR -0.009, P=0.005, Page-interaction=0.001, N=2070 vs 878). They tended to have higher BMI (betaBMI 0.209, P=0.126 vs betaBMI -0.297, P=0.214 for women aged <50 years, Page-interaction=0.026, N=2204 vs 964). For rs2273335 near EXOSC10, postmenopausal women had significantly lower WC (betaWC -1.030, P=0.006) and BMI (betaBMI -0.350, P=0.023) than women aged <50 years (betaWC 0.559, P=0.388, Page-interaction=0.001; betaBMI 0.335, P=0.217, Page-interaction=0.002). For rs2076658 near mTOR, lower WC (betaWC -1.093, P=0.027) was seen in postmenopausal women than those aged <50 years (betaWC 0.630, P=0.434, Page-interaction=0.007).

Conclusion:
Three variants on mTOR locus demonstrated significant age-specific effects with overall and central adiposity in Chinese women with T2D.


Secreted frizzled-related protein 5 restores Wnt5a-induced impairment of vasorelaxation and might act as a compensatory factor against atherosclerosis in patients with metabolic dysfunction.

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Objective:
Wnt5a is a potent signaling molecule in the non-canonical Wnt pathway that is strongly implicated in obesity, metabolic disorders, and atherosclerosis. Secreted frizzled-related protein 5 (Sfrp5), an endogenous inhibitor of Wnt5a is an anti-inflammatory adipokine that exerts beneficial effects against metabolic dysfunction. However, little is known about the role of Sfrp5 in the pathogenesis of atherosclerosis, with conflicting results between the human and animal studies. Therefore, we aimed to investigate whether administering Sfrp5 would restore the Wnt5a-induced endothelial dysfunction in the human endothelial cells and isolated rat aorta. In addition, we sought to determine the association of serum Sfrp5 concentrations with atherosclerosis by measuring brachial-ankle pulse wave velocity (baPWV) in humans.

Methods:
Transcript levels of JNK, Akt, endothelial nitric oxide synthase (eNOS) were analyzed on human umbilical vein endothelial cells (HUVECs) treated with Wnt5a in the presence or absence of Sfrp5. Isometric force displacement transducer was used for ex vivo measurement of endothelium-dependent vasorelaxation. Circulating Sfrp5 and Wnt5a levels and baPWV were measured in 282 human subjects with type 2 diabetes.

Results:
Sfrp5 dose-dependently restored the Wnt5a-induced impaired vasorelaxation in rat thoracic aorta by an eNOS-dependent mechanism. Similarly, Sfrp5 treatment restored the Wnt5a-induced reduction of NO production via eNOS in HUVECs. The
Modifiable risk factors in the first 1000 days for subsequent risk of childhood overweight in an Asian cohort

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Objective: Many studies have identified early-life risk factors for subsequent childhood overweight/obesity, but few have evaluated how they combine to influence risk of childhood overweight/obesity. We examined associations, individually and in combination, of potentially modifiable risk factors in the first 1000 days after conception with childhood adiposity and risk of overweight/obesity in an Asian cohort.

Methods: Six risk factors were examined: maternal pre-pregnancy overweight/obesity (body mass index (BMI) ≥25 kg/m2), paternal overweight/obesity at 24 months post-delivery, maternal excessive gestational weight gain, raised maternal fasting glucose during pregnancy (≥5.1 mmol/L), breastfeeding duration <4 months and early introduction of solid foods (<4 months).

Associations between number of risk factors and adiposity measures [BMI, waist-to-height ratio (WHtR), sum of skinfolds (SSF), fat mass index (FMI) and overweight/obesity] at 48 months were assessed using multivariable regression models.

Results: Of 858 children followed up at 48 months, 172 (19%) had none, 274 (32%) had one, 244 (29%) had two, 126 (15%) had three and 42 (5%) had ≥4 risk factors. Adjusting for confounders, significant graded positive associations were observed between number of risk factors and adiposity outcomes at 48 months. Compared to children with no risk factors, those with 4 or more risk factors had SD-unit increases of 0.78 (95% CI 0.41-1.15) for BMI; 0.79 (0.41-1.16) for WHtR; 0.46 (0.06-0.83) for SSF and 0.67 (0.07-1.27) for FMI. The adjusted relative risk of overweight/obesity in children with four or more risk factors was 11.1 (2.5-49.1) compared to children with no risk factors. Children exposed to maternal pre-pregnancy [11.8 (9.8-13.8)%] or paternal overweight status [10.6 (9.6-11.6)%] had the largest individual predicted probability of child overweight/obesity.

Conclusions: Early-life risk factors added cumulatively to increase childhood adiposity and risk of overweight/obesity. Early-life and preconception intervention programmes which concurrently address these multiple modifiable risk factors may be effective in preventing overweight/obesity.

NFIA controls the brown fat gene program by co-localizing with PPARα at cell-type-specific enhancers

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Brown fat dissipates energy in the form of heat by means of the uncoupling protein-1 (UCP1) on the mitochondrial inner membrane. In humans, brown fat activity is inversely correlated with body mass index. And several pilot studies have shown that therapeutic interventions such as chronic cold exposure successfully recruit human brown fat and increase systemic energy expenditure. Therefore, stimulating development and/or function of brown fat would be a novel strategy for the treatment of obesity and its complications. However, global landscape of brown fat development is not entirely understood. Here, we identified nuclear factor I-A (NFIA) as a novel transcriptional regulator of brown fat. The binding motif for Nuclear
**Obesity and physical activity linked to hepatocellular carcinoma mortality in individuals with or without diabetes mellitus**

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**Introduction:**

It remained to be clarified whether obesity and physical activity are associated with the risk of dying from hepatocellular carcinoma (HCC) in individuals with or without diabetes mellitus (DM).

**Methods:**

We prospectively followed up 88,116 participants without DM and 3,509 participants with DM. The primary outcomes were deaths from HCC, endemic in Taiwan.

**Results:**

During a maximum of 10 years, there were 271 deaths from HCC. Obesity (BMI was ≥30 kg/m²) was associated with a higher adjusted risk of dying from HCC in total participants and participants without DM (adjusted hazard ratio [HR], 2.43; 95% confidence interval [CI], 1.40 to 4.23). Nonetheless, obesity was not associated with deaths from HCC in participants with DM. On the other hand, inadequate physical activity were observed to be at elevated risk of dying from HCC in total participants (adjusted HR, 1.57; 95% CI, 1.19 to 2.06), participants with DM (adjusted HR, 2.26; 95% CI, 1.16 to 4.49), and participants without DM (adjusted HR, 1.45; 95% CI, 1.07 to 1.96). In subgroup sensitivity analysis for individuals without chronic hepatitis B or C infection, the associations remained similar. The positive association between obesity and HCC deaths in participants without DM persisted in women (adjusted HR, 2.44; 95% CI, 1.20 to 4.96) rather than men. Contrarily, the positive association between inadequate physical activity and risk of dying from HCC persisted in total male participants and male participants with DM (adjusted HR, 2.42; 95% CI, 1.02 to 5.78), but lost in male participants without DM and the female counterparts.

**Conclusion:**

We pioneered to demonstrate the higher HCC mortality related to obesity in individuals without DM and inadequate physical activity regardless of DM. We suggest keeping not obese and physically active to associate with reduced subsequent HCC deaths even in adults without chronic viral hepatitis.

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**Effects of intermittent fasting, with and without calorie restriction, on human metabolic health**

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Intermittent fasting (IF) improves metabolic health in both rodent and human models. However, it is unclear whether continuous energy restriction or IF produces optimal health outcomes, or whether weight loss is necessary for the beneficial health effects of IF.

Healthy women who were overweight (n=88, 50.2±0.9 y. BMI 32.2±0.5 kg/m²) were randomly assigned to 1 of 4 groups for 8 weeks in a 2:1 intervention: control ratio. Participants were provided with all foods at 70% (IF70 and DR70), or 100% (IF100 and control) of calculated energy requirements. IF groups fasted for 24h from 0800h on 3 non-consecutive days per week.

Weight, body composition, insulin sensitivity (by hyperinsulinaemic-euglycaemic clamp [60mU/m²/min]), HOMA-IR and plasma/serum markers of health, were assessed at baseline and 8-weeks after a 12h overnight fast, and again 3-7 days later after a 24h fast (in IF groups only).

The IF70 group lost more weight and body fat compared with all other groups (vs IF100 and control all P<0.0001; vs DR70 both P<0.05), despite prescription of a similar energy deficit to the DR70 group. The IF100 group lost more weight vs. control (P<0.0001). Fasting insulin and HOMA-IR were improved in IF70 (both P<0.0001) and DR70 (both P=0.01) groups vs the IF100 group. There was no effect of group on insulin sensitivity by clamp. A 24h fast reduced insulin sensitivity (P=0.02), however this was not different between IF70 and IF100 groups. Improvements in plasma lipids and liver enzymes were not different between groups. Fasting non-esterified fatty acids (NEFAs) were reduced in IF70 vs DR70 and control groups (both P<0.05).
The surgical treatment of diabetes

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Gastrointestinal (GI) operations originally used for the treatment of ulcers/cancer or morbid obesity (bariatric surgery) can cause major improvement of glucose metabolism and durable remission of type 2 diabetes. Experimental evidence from animal and human studies show that such effects are at least in part independent on weight loss and directly result from changes in the anatomy and physiology of the GI tract. These findings provide a biological rationale for repurposing GI operations as a treatment for diabetes itself, a practice referred to as metabolic surgery. Numerous randomized clinical trials comparing surgery vs conventional medical therapies and lifestyle intervention for type 2 diabetes now show that metabolic surgery can achieve prolonged disease remission or major glycemic improvements, as well as reduction of medication usage and cardiovascular risk in overweight and obese patients. On the back of such evidence, the 2nd Diabetes Surgery Summit (DSS-II), an international consensus conference, recommended that metabolic surgery be considered as a treatment option for type 2 diabetes in patients with BMI >30kg/m2 or >27.5kg/m2 in case of Asian ethnicity. The DSS-II recommendations and guidelines are currently endorsed by over 50 international organizations including the Australian Diabetes Society and other leading diabetes, endocrinology and surgical societies. In January 2017, the American Diabetes Association has incorporated the DSS-II recommendations in their Standard of Medical Care. Over the past decade, efforts to explain how surgery on the gut controls diabetes have identified several potential mechanisms. Changes in gut hormones, bile acids, intestinal glucose transport and metabolism, microbiota and nutrient sensing appear to contribute. Emerging evidence also suggest surgery may tackle dysfunctional GI mechanisms that contribute to diabetes pathophysiology. This presentation illustrates the DSS-II guidelines as well as their supporting biological and clinical evidence.

Unraveling the links between adiposity and metabolic disease

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Excess adipose tissue leads to a myriad of diseases; however, the underlying mechanisms linking them together are just now becoming clearer. We’ll take a global view of the field of adipose tissue pathobiology - including the harmful effects of abdominal adiposity. This introduction will provide the context for new research pointing to the protective effects of lower body subcutaneous (LBSC) adipose tissue.

Epidemiological studies have identified that adipose tissue below the waistline, also known as lower body subcutaneous (LBSC) adipose tissue are associated with a decreased risk of cardiovascular disease in both men and women. In contrast, upper body subcutaneous adipose tissues (UBSC) and deeper adipose tissues (visceral, intermuscular, peri-cardial) are associated with increased CV risk. The reduced CV risk remains after adjusting for traditional cardiometabolic risk factors such as blood pressure, LDL-cholesterol, HDL-cholesterol and triglycerides.

The exact mechanism(s) responsible for the differences in adipose tissue effect are unknown. It is known that the repertoire of receptors on the surface of adipocytes is different between UBSC and LBSC. For example, Growth Hormone (GH) Receptors are increased in UBSC vs. LBSC; this is consistent with functional data in vivo and in vitro. The alpha adrenoreceptor repertoire is also different accounting for some of the differences in lipid flux under physiological conditions. Similarly, the repertoire of estrogen and progesterone receptors is different. Together, these differences explain how the hormonal milieu (sex steroids, cortisol, GH) can shape the deposition of energy in LBSC vs. UBSC adipose tissue and influence lipid dynamics. A key alternative hypothesis is that LBSC might secrete a beneficial factor to prevent insulin resistance, inflammation and lipotoxicity.

A critical remaining question is “how does LBSC adipocyte differ from a UBSC adipocyte?”. To answer this question we collected LBSC and UBSC adipose tissue, adipocytes, and pre-adipocytes from healthy, young prototypically ‘normal’ men and women. The women all had a normal gynoid ‘pear’ shaped body fat distribution and the men were android or ‘apple’ shaped. Our hypothesis was that subjecting LBSC and UBSC adipose tissue to deep mRNA, miRNA, and IncRNA profiling would identify novel differences in the transcriptome. Furthermore, if the differences were maintained ex-vivo in pre-adipocytes cultured from these same regions, we hypothesized that this would support epigenetic programming of these key tissues and reveal a deeper understanding of the mechanism(s) responsible for the protective effects of LBSC adipose tissue.

We will discuss the mRNAs, miRNAs, and IncRNAs that are differentially expressed between LBSC and UBSC, chromosomal hot spots that appear to govern the RNA differences, and new data on the role of epigenetic programming as a mechanism underlying these differences. Several HOX genes (Chr. 12 and 7) appear critical to the cell autonomous program, & we will highlight a lncRNA called HOTAIR that may set the epigenetic program in motion. We will also peer into the future and explore how this information might inform new preventive strategies through the early identification of critical epigenetic programming which determines CV disease risk.
Obesity management is stymied by clinical ignorance

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1. University Of Sydney, Camperdown, NSW, Australia

Obesity treatment is becoming more and more effective with a range of options which can be applied depending on the on the individual’s degree of obesity and presence of co-morbidities. As well as reduction in risk factors, prevention of diabetes and cancer, weight loss does reduce mortality and improve disease control and quality of life. There is increasing evidence of a “legacy effect” of a period of weight loss. Obesity is recognised as a chronic disease. Despite this evidence and situation, there remains a remarkable degree of uncertainty in the health profession about the effectiveness and necessity of obesity treatment (and prevention) and a marked unwillingness to move from the standard ways of treating chronic disease. This inertia is due to both ignorance and to protection of one’s turf.

Obesity management should be stratified depending on the degree of obesity and the outcomes required. This means treatment pathways need be developed Obesity management is also the core of chronic disease management. With obesity management as the central component (and with a common group of health professionals staffing it, other specialist services can be “bolted on” as required. Such an approach will produce better outcomes, reduce the multiple visits to clinics patients often experience and will reduce health costs.

So why isn’t this happening? Ignorance and prejudice are the reasons!

Action to prevent obesity in Australia - are we making progress?

Jane Martin
1. Obesity Policy Coalition, Carlton, VIC, Australia

Australia has seen numerous reviews and recommendations put to government over the last twenty years to address and prevent obesity. However, despite these attempts, little has changed and in fact funding for obesity prevention has declined at a federal level. Australia has developed an evidence-based suite of recommendations together with a staged implementation plan, but there is a block around implementation of these policies and programs. This presentation will discuss the barriers to progress at a federal level, as well as outlining pockets of progress in a number of other jurisdictions. It will also consider ways to amplify and accelerate change.

World perspective on the role of bariatric surgery

Kelvin Higa
1. Fresno Heart & Surgical Hospital, Fresno, CA, United States

The obesity epidemic otherwise known as “adiposity-based chronic disease” has become the most important public health issue of our time. Despite efforts to limit caloric intake, promote exercise and heighten awareness, the numbers of affected individuals continue to grow exponentially. Despite decades old research and new insights into the biological/genetic causation of the disease, health care providers are reluctant to abandon the often dangerous and ineffective dictum of “diet and exercise” prescription to combat a problem of self-control. Despite the effectiveness of surgical interventions; they are costly and cannot be applied to the masses. However, analysis of the pathophysiology of our interventions can provide insight into non-invasive or preventive measures that can be adopted globally.

What’s happening & needs to happen in Australia

Ahmad Aly
1. Austin Health, Forest Hill, VIC, Australia

Although bariatric surgery is the most effective treatment modality for obesity, only around 1.5% of the population that potentially benefits, undergo surgery. The reasons for this are complex. Further, there is inequity in access with less than 10% of surgery performed in the public sector. At such levels, bariatric surgery is not a population level intervention. It helps a very small minority of individuals. But could it do more? The presentation will explore how increased utilisation of bariatric surgery could be encouraged, the potential impact of this in the “obesity crisis” and the importance of this in the public sector from an Australian perspective.

Mechanisms underlying the efficacy of a rodent model of sleeve gastrectomy– a focus on energy expenditure
Bariatric surgery remains the only effective treatment for morbid obesity. Sleeve gastrectomy (SG) has recently increased in popularity and is associated with 60-80% excess weight loss; however, the mechanisms underlying SG-mediated weight loss are unclear. Diet-induced obese male Sprague-Dawley rats (n=58) were either sham-operated or underwent SG and had ad libitum access to food. A subset of sham-operated rats was pair-fed to the food consumed by the SG group. The first cohort (n=23) were used to establish the rodent model of SG in our hands and detail its impact on metabolic parameters. Body composition was assessed using DEXA prior to surgery and at the end of 30 or 34-day treatment. Food intake and body weight were monitored daily. Rats were also housed in indirect calorimetry cages for the assessment of oxygen consumption and carbon dioxide production. To further elucidate the contribution of energy expenditure, particularly in brown adipose tissue (BAT), to SG-induced weight loss, a second cohort of animals (n=22) were implanted with biotelemetry devices between the interscapular lobes of BAT to assess local changes in BAT temperature. In a third cohort (n=13), neuronal activation, indicated by elevated Fos protein in the nucleus of the solitary tract (NTS), was assessed in response to SG. In all cohorts, SG caused a significant reduction in both body weight and cumulative food intake (P<0.0001) with commensurate reductions in fat mass (P<0.001), fat percentage (P<0.05) and lean mass (P<0.05) compared to sham surgery. Importantly, SG was associated with an increase in BAT thermogenesis, demonstrated by an elevation in BAT temperature (P<0.0001) and UCP1 expression (P<0.01). Whole body oxygen consumption was not different between sham-operated and SG animals. SG significantly elevated Fos expression in the NTS compared to sham surgery (P<0.05). These data support a role for BAT thermogenesis in SG-mediated weight loss.

The Relationship between Degree of Weight Loss and Changes in Gut Hormones that Control Hunger and Satiety

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2. Latrobe University, Bundoora, VIC, Australia

Introduction:
Previous research demonstrates that weight loss results in long lasting changes in gut hormones leading to increased hunger and decreased satiety. The aim of this study was to determine at what degree of weight loss physiological adaptations occur and if the magnitude of gut hormone changes are proportional to the degree of weight loss.

Methods:
Subjects were placed on a VLED program to achieve a 15% weight loss. Gut hormone levels were measured during a mixed meal test (at 0, 30, 60, and 240 minutes) at baseline, 5%±1%, 10%±2% and 15%±2.5% weight loss. Hormones measured were total ghrelin (pg/mL), leptin (ng/mL), amylin (pg/mL), GLP1 (pg/mL) and GIP (pg/mL).

Results:
Of 97 subjects who began the study, data presented here include only the 50 subjects who completed the study. At the 5% weight loss level 4 out of 5 fasting hormones measured showed significant change (data presented as mean (SE), p-value): leptin -7.91 (0.77), p< 0.0001; amylin -24.84 (2.97), p<0.0001; GLP1 -22 (7.18), 0.003; and GIP +44.72 (15.86), 0.006. There was a non-significant decrease in fasting ghrelin -28.69 (17.57), 0.105. There was no correlation between degree of weight loss and the magnitude of hormone changes.

Conclusion:
The fact that hormone changes occur at 5% weight loss and that they appear not to change any further by 15% weight loss, suggests that marked weight loss is not more difficult to maintain than modest loss.

Dynamic simulation modelling for guiding action on childhood overweight and obesity

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2. Sax Institute, Sydney, NSW, Australia

Introduction:
The increasing prevalence of childhood overweight and obesity raises significant concerns about the effect on individuals’ health, society and the economy. Childhood overweight and obesity is a complex problem, with many inter-related causes and points for intervention. There is, however, little consensus over which interventions are likely to be most effective. The NSW Ministry of Health, in partnership with the Australian Prevention and NSW Department of Premier and Cabinet, developed a dynamic simulation model to test different policy and program scenarios that will meet the NSW Premier’s target to reduce childhood overweight and obesity by 5% within 10 years.

Methods:
A dynamic simulation model has been developed that captures the complexity of the childhood overweight and obesity problem in NSW, and simulates the impact of different intervention options. A participatory approach was used from May to November 2016 to engage academic and policy experts, program planners, clinicians and health economists in developing the model, drawing on research evidence, grey literature, program data, and expert knowledge.
Gut serotonin is a signalling nexus between the gut microbiome and host metabolism

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Serotonin (5-HT), produced from enterochromaffin (EC) cells within the gut, has important signalling roles in metabolism by triggering hepatic gluconeogenesis, contributing to peripheral insulin resistance via actions on hepatocytes and adipocytes [1] and increasing fat mass and obesity by suppressing thermogenesis [2,3]. The gut microbiome has similar effects on host metabolism and has recently been shown to augment EC cell 5-HT content [4,5]. We therefore assessed whether the gut microbiome regulates host metabolism via modulation of gut 5-HT. Mice were treated for 28 days with either (1) antibiotics (Abx), (2) the TPH1 inhibitor LP533401 to reduce EC cell 5-HT, or (3) a combination of both treatments. Depletion of intestinal microbiota significantly improved peripheral insulin sensitivity and glucose tolerance, and reduced fasting blood glucose (FBG) levels and white adipose fat mass. LP533401 treatment also increased insulin sensitivity, improved glucose tolerance and decreased FBG, although to a lesser extent than the Abx group. Serum 5-HT and mucosal 5-HT content were reduced to similar levels by either treatment. Importantly, mice treated with both LP533401 and Abx similarly showed no additional improvement in insulin sensitivity, glucose tolerance and decreased FBG compared to Abx alone. These effects are independent of feeding and activity behaviour. MRI analysis of body fat revealed mice from all three treatment groups had reduced volume of subcutaneous adipose tissue compared to controls. LP533401 treated mice showed a shift in Day 28 faecal microbiota composition compared to Day 0 and controls. Our data demonstrates that resident intestinal microbiota are acting, in part, via gut 5-HT to modulate host metabolism, and that this relationship appears to be bi-directional.


Effects of intermittent fasting, with and without calorie restriction, on human metabolic health

Amy T Hutchison1, 2, Bo Liu1, 2, Rachel E Wood3, Campbell Thompson4, Gary Wittert1, 2, Leonie Heilbronn5, 1
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Intermittent fasting (IF) improves metabolic health in both rodent and human models. However, it is unclear whether continuous energy restriction or IF produces optimal health outcomes, or whether weight loss is necessary for the beneficial health effects of IF.

Healthy women who were overweight (n=88, 50.2±0.9 y, BMI 32.2±0.5 kg/m²) were randomly assigned to 1 of 4 groups for 8 weeks in a 2:1 intervention: control ratio. Participants were provided with all foods at 70% (IF70 and DR70), or 100% (IF100 and control) of calculated energy requirements. IF groups fasted for 24h from 0800h on 3 non-consecutive days per week. Weight, body composition, insulin sensitivity (by hyperinsulinaemic-euglycaemic clamp [60mU/m²/min]), HOMA-IR and plasma/serum markers of health, were assessed at baseline and 8-weeks after a 12h overnight fast, and again 3-7 days later after a 24h fast (in IF groups only).

The IF70 group lost more weight and body fat compared with all other groups (vs IF100 and control all P<0.0001; vs DR70 both P=0.05), despite prescription of a similar energy deficit to the DR70 group. The IF100 group lost more weight vs. control (P<0.0001). Fasting insulin and HOMA-IR were improved in IF70 (both P<0.0001) and DR70 (both P=0.01) groups vs the IF100 group. There was no effect of group on insulin sensitivity by clamp. A 24h fast reduced insulin sensitivity (P=0.02), however this was not different between IF70 and IF100 groups. Improvements in plasma lipids and liver enzymes were not different between groups. Fasting non-esterified fatty acids (NEFAs) were reduced in IF70 vs DR70 and control groups (both P<0.05).

Intermittent fasting, with prescribed energy restriction is a legitimate and effective alternative to daily energy restriction, and may be superior, at least in the short term.
Impact of overweight and obesity on life expectancy in Australian adults aged 20-29 years

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Background and significance:
Adult obesity has been linked with an increased risk of numerous adverse health outcomes and lower life expectancy (LE) when compared to healthy and overweight individuals. However, differences in life years lost (LYL) attributed to being overweight or obese in young adulthood has not been quantified in Australia.

Our aim is to predict remaining LE of Australian men and women aged 20-29 by body-mass index (BMI) categories: healthy (BMI 18.5-24.9 kg/m²), overweight (BMI 25.0 – 29.9 kg/m²), and obese (BMI >30.0 kg/m²). This is important in understanding the long-term consequences of obesity at a population level in Australia.

Methods:
We used a validated microsimulation model of obesity progression in Australia that integrates annual change in BMI based on age and sex, with Australian life table data and published relative risk of all-cause mortality for different BMI categories. Remaining LE and LYL estimated using an input population consisting of 3,226,902 adults aged 20-29 from the 2014/15 Australian National Health Survey.

Results:
Estimated remaining LE for healthy weight men and women aged 20-29 was approximately 57.0 (95% CI 56.7 – 57.4) and 59.8 (95% CI 59.4 – 60.0), respectively. Compared to those in the healthy BMI category, life years lost as a result of being overweight was approximately 4.2 and 3.6 years for men and women, respectively. For those with obesity in early adulthood the loss in life expectancy was predicted to be 9.0 and 6.9 years for men and women, respectively.

Conclusions:
Being overweight and obese in early adulthood results in a substantial loss of remaining life expectancy, particularly for men. The increasing trend towards obesity at younger ages suggests that this will be exacerbated in the future, and highlights the need for obesity prevention for targeted interventions in young adults in Australia.

Identification and characterisation of human adipocyte precursor cells

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The formation of new mature adipocytes is strictly dependent on the presence of tissue resident adipocyte precursor cells (APCs) and the identity of human APCs remain largely unknown. Moreover, lipid metabolism in mature adipocytes is influenced by their anatomical location. Expanding visceral (VAT) and abdominal subcutaneous (ASAT) adipose tissues are often associated with metabolic diseases and contrastingly, expanding gluteo-femoral (GFAT) adipose tissue protects against metabolic diseases. Whether the site-specific properties of adipocytes located within these regions confer these metabolic differences is unknown. Hence, we aimed to identify the APCs present in these adipose tissue depots and assess their metabolic properties.

We identified and isolated three APCs through Fluorescent Activated Cell Sorting as CD31+CD45+CD29+CD34−, CD31+CD45−CD29+CD34− and CD31+CD45−CD29−CD34− from the stromal vascular fraction (SVF) of human (N=20) VAT, ASAT and GFAT. The APCs made up 30-40% of all SVF cells and GFAT was enriched with more APCs when compared with ASAT and VAT. The subcutaneous depots were highly enriched with CD34+APCs compared with CD34−APCs. VAT was enriched with similar numbers of CD34+ and CD34−. RNAseq analysis identified marked differences in the transcriptome of the three APCs and there were subtle differences in their proliferative capacities. All three APCs were able to undergo adipogenesis and form mature adipocytes in vitro.

The differentiated APCs exhibited differences in their metabolic capacities. Rates of lipolysis and fatty acid uptake and storage were higher in CD34+ compared with CD34− and CD34− APCs, the latter having very low fatty acid turnover. Interestingly, the proportion of CD34+ APCs was higher in the VAT of individuals with type 2 diabetes, suggesting that dysregulated lipolysis commonly observed in these individuals may be attributed to alterations in APC abundance. Summarily, we have identified three distinct bona fide APCs varying in their depot-specific abundance and metabolic capacities.

The intermittent fast diet in adolescents with obesity: a pilot study

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Intermittent fast diets in adults are as effective as continuous energy restriction. This is the first study to investigate the effectiveness and acceptability of an intermittent fast diet (IFD) in adolescents with obesity.

Methods:
During weeks 1-12, participants followed an IFD consisting of a Very Low Energy Diet (VLED) 3 days/week (500-600 kcal/day) and a standard healthy diet 4 days/week. For weeks 13-26, participants were given a choice to continue with 1-3 days of VLED/week or follow a standard healthy diet. Outcomes measured at 0, 12 and 26 weeks were weight, fasting glucose, insulin sensitivity, lipids and diet acceptability.

Results:
30 participants, aged 12-17 years (mean [SD] 14.5yrs [1.4], female n=25) with a median BMI 34.9kg/m² (range: 27.7-52.4), were recruited and to date, 19 have completed the 26 week protocol. The study will be complete in August 2017. Compared with baseline, both body weight and BMI were reduced at 12 weeks (mean [SD], n=20, -3.5kg [3.7], -1.4kg/m² [1.3]) and 26 weeks (n=18, -2.1kg [7.9], -0.9 kg/m² [2.6]). Fasting insulin (n=18, -26.2pmol/l) and triglycerides (n=16, -0.2mmol/L) were reduced at 12 and 26 weeks, respectively. The reduction in insulin was sustained to 26 weeks in those who maintained or continued to lose weight (n=10, -36.6pmol/l). At 12 weeks, all participants chose to continue with the IFD with 2 days/week (n=11) or 3 days/week (n=10) of VLED. Adolescents found the IFD acceptable, rating it as easy (mean [SD] n=15, +2.1 [1.2]) and pleasant (mean [SD] n=15, +1.7 [1.2]) on a Likert scale from -4 to +4.

Conclusion:
Intermittent fast diets may be an effective and acceptable dietary intervention in adolescents with obesity. A randomised controlled trial is required to compare IFD with continuous energy restriction.

This study was funded by the Foundation for Children and Heart Foundation of Australia Vanguard Grant.

The burden of inaction on socioeconomic differences in obesity among Australian adults

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Australian adults with greater socioeconomic disadvantage have a higher prevalence of obesity and a disproportionate share of incident and fatal cancers and cardio-metabolic diseases compared to those with lesser socioeconomic disadvantage. We aim to quantify the burden of five obesity-related cancers and cardio-metabolic diseases attributable to socioeconomic differences in obesity for those with greatest socioeconomic disadvantage and the total population.

For adults aged 20 to <85 years in 2016, stratified by SEIFA quintile (an area-level indicator of socioeconomic disadvantage which ranks individuals from most (SEIFA 1) to least (SEIFA 5) disadvantaged), we calculated the number of individuals with overweight (BMI ≥25 and <30 kg m⁻²) or obesity (BMI ≥30 kg m⁻²), incident diabetes, deaths from coronary heart disease (CHD) and cerebrovascular disease, and incident cases and deaths from colorectal cancer and breast cancer (women 50 to <85 years only) using most recent national estimates. We calculated the counterfactual number of cases or deaths for each disease expected to occur if all groups had the same overweight and obesity rates as observed for SEIFA 5 (37% overweight, 22% obese). These were compared to yield the burden attributable to socioeconomic differences in obesity.

In Australia in 2016, 15,372 cases of incident diabetes and cancer, and 705 deaths were attributable to inequalities in overweight and obesity. For those with greatest socioeconomic disadvantage (SEIFA 1) we estimate that 18.5% (6,442 cases) of incident diabetes and 7.5% (193 deaths) of CHD deaths could be avoided if overweight and obesity rates were the same as those with least socioeconomic disadvantage (SEIFA 5). In the total population we estimate that 12.0% (14,962 cases) of incident diabetes and 4.6% (482 deaths) of CHD deaths could be avoided.

Reducing socioeconomic inequalities in obesity would benefit those with greatest socioeconomic disadvantage and the total population, and must be prioritised in population level obesity policies.

The Australian experience - ANZOS initiatives

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EatSmart@school.hk: A 10-year interim evaluation

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Among primary school children in Hong Kong, after a progressive increase in the rate of overweight or obesity from 16.4% in 1996 to 19.4% in 2006, we observe a gradual but sustained decline since 2009.

To cope with the rising tide of various chronic diseases associated with obesity, we adopt a life-course approach and population-based strategies. We have been promoting healthy lifestyle in different settings. School is an important setting for our health promotion efforts against unhealthy diet.

The EatSmart@school.hk was launched in school year 2006/07 among primary school students. The objectives of the Campaign are to raise public awareness and concern about healthy eating among children, and to create an environment that is conducive to healthy eating in schools and the community.

The program adopts a comprehensive strategy: building a supportive environment; incorporating research & evaluation; promoting education & empowerment; developing publicity & advocacy; and alliance building.

A Steering Committee including related government organizations, professional associations (including HKASO), education sectors, committee on Home-School cooperation and Radio Television Hong Kong was formed to overlook the continuous development of the program. Core activities implemented since 2006 include: Nutritional Guidelines on Lunch for Students; Nutritional Guidelines on Snacks for Students; Nutrition Training Workshops for School Staff; Nutritional Cooking Training Workshops for Chefs; Handbook of Selection of Lunch Suppliers; School lunch suppliers database and “EatSmart School Accreditation Scheme”.

The program received a Special Recognition Award from the Western Pacific Regional Office of the World Health Organization (WHO) as a contribution to the scaling-up of healthy cities in October 2012.

Indonesia’s effort in combating obesity

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According to WHO in 2008, 65% of the world’s population lives in countries where obesity and overweight kill more than underweight (including high and middle income countries). At least 2.8 million adults die each year from overweight and obesity. In addition, overweight and obesity have a risk of developing diabetes (44%), ischemic heart disease (23%) and cancer (7%). In Indonesia, based on Basic Health Research (RISKESDAS), showed an increased prevalence of obesity in people > 18 years old from 11.7% (2010) to 15.4% (2013). RISKESDAS also shows a disparity in the prevalence of obesity in some provinces in Indonesia.

Increased obesity will have an impact on the increase in health financing. It is estimated that next 30 years the cost of obese medication every year in Indonesia who suffer from Diabetes Mellitus (DM) without complications around 2.9 trillion rupiah and DM with complications around 66.9 trillion rupiah (PT Askes, 2011). Obesity not only impact on physical health, but also on social and economic issues.

Obesity is caused by several factors:

- Genetic, environmental, medicinal and hormonal. Based on RISKESDAS data, 40.7% of Indonesians consume fatty foods, 53.1% consume sweet foods, 93.5% less consumption of vegetables and fruits, and 26.1% less physical activity. Vegetable consumption is only 57.1 grams per person per day (recommendation is 200-300 gram per person per day) and the consumption of fruits and dairy products is 33.5 grams per person per day (recommendation is 3-5 gram per person per day). This figure is still low so it is not sufficient for the body’s need for vitamins, minerals, and fiber.
- Based on these conditions, it is necessary to make an innovative serious effort by involving various elements including the central government, local government, community, and industries. These efforts are expected to halt the prevalence rate of obesity in Indonesia by 15.4% until the end of 2019 in accordance with the indicators in the National Medium-Term Development Plan 2015-2019 set out in Presidential Regulation on 2015.

In order to optimize for controlling obesity, the general policy of Non Communicable Disease Prevention should be based on community participation and empowerment because health is a shared responsibility of society, private, and government. One important effort is to encourage community self-sufficiency to live healthy, so community-based obesity control strategies generally include strengthening laws, regulations and legislation, enhancing community empowerment, conducting operational research, partnership approaches, upgrading and developing resources, improving evidence-based interventions.

In response to the above matters, the Ministry of Health in accordance with its authority, main duty and function make a General Guideline of Obesity Control which cooperate with cross program, cross sector, professional organization, non-governmental organization and industries. General Guideline of Obesity Control is expected to be a reference in implementing the Non Communicable Disease Prevention program, especially obesity control for health workers throughout Indonesia and related agencies.
Changes in metabolic parameters and energy expenditure of morbidly-obese individuals after bariatric surgery.

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Aims:
Bariatric surgery is associated with improvement in cardiometabolic health. Our study aims to compare body composition changes, resting energy expenditure (REE) and insulin sensitivity in morbidly-obese patients compared to healthy controls at baseline and 6 months after sleeve gastrectomy (SG).

Methods:
Non-diabetic subjects (N=9, age 21-50 years) undergoing SG were studied at baseline and 6 months after surgery. Non-obese subjects (N=9, age 22 - 47 years) were used as controls and were studied once. Study participants undergo a body composition analysis using bioimpedance analysis, indirect calorimetry to measure REE and glucose homeostasis quantification using oral glucose tolerance testing and hyperinsulinemic-euglycemic clamp.

Results:
After bariatric surgery, there were significant decreases in weight (118.5 ± 23.3 vs 91.9 ± 16.6 kg), BMI (40.2 ± 4.5 vs 31.3 ± 2.9 kg/m2) and fat mass (56.8 ± 14.6 vs 37.0 ± 12.9 kg). However, these remained higher compared to the non-obese controls. Obese subjects had significantly higher REE at baseline compared to controls (2234.7 ± 544.1 vs 1461.4 ± 314.1 kcal/day; 36.3 ± 4.0 vs 28.7 ± 2.6 kcal/kg FFM/day). Although total REE decreases after surgery (2234.7 ± 544.1 vs 1772.5 ± 376.9 kcal/day), it did not change significantly when quantified based on fat-free mass, FFM (36.3 ± 4.0 vs 34.3 ± 5.2 kcal/kg FFM/day). Postoperatively, there was a significant decrease in fasting blood glucose levels (106.3 ± 11.9 vs. 91.7 ± 6.4 mg/dL) with improvement in insulin sensitivity (2.0 ± 0.8 vs. 4.9 ± 1.2 mg/kg/min), insulin metabolic clearance rate (12.1 ± 3.0 vs. 15.9 ± 3.3 ml/kg/min) and glucose disposition index (1.7 ± 1.6 vs 4.9 ± 2.6).

Conclusion:
Weight loss following bariatric surgery was mainly secondary to fat mass loss (74%) and associated with improvements in various glucose homeostasis parameters and preserved REE quantified based on FFM.

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Obesity in Malaysia: Issues and challenges

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Malaysia’s sustained economic growth and political stability over the last five decades has brought about rapid demographic and nutrition transition which has inevitably generated marked changes in dietary habits and life styles of Malaysian. The prevalence of obesity in all age-groups once thought to be an urban phenomenon, has now spread to the rural population at an alarming rate, implying calories imbalance that contribute to weight gain. The “fat - sugar laden” local dishes and the “westernization” of global eating habits, made possible through food imports, fast foods and 24 hours food outlets has led to a rising consumption of fats and sugars coupled with, sedentary lifestyle are largely responsible for the rising epidemic of obesity and associated diseases. It is becoming more apparent that the traditional approach appears to have failed while actions to act decisively to help combat the increasing prevalence has been few and overall rather uncoordinated while efficacy of intervention programmes are rarely reported. A recent study (EIU, 2017) revealed total cost of obesity estimated to be between 10% and 19% of national healthcare spending. It is imperative that both short and long term preventive strategies need to be developed since Malaysians are susceptible to enhanced co-morbidities with quite modest weight gain. Unless we could make policy makers, professionals and the population at large understand the threat obesity poses and the urgency to implement possible solutions now, the natural course would be an obesity epidemic that will continue to grow beyond our control in the coming decades. This paper will highlight the prevalence and trends, issues related to the problem, efforts made to curb them and the mounting challenges that we faced in Malaysia.

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Central obesity measured by controlled attenuation parameter but not body mass index is more important factor to predict significantsteatosis

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Background:

The central obesity significantly contribute to occurrence of hepatic steatosis, but the relationship between controlled attenuation parameter (CAP) value, which is noninvasive method of measuring hepatic steatosis, and visceral fat area (VFA) by computed tomography (CT) which represents central obesity, is not investigated yet.

Methods:
A total of 304 consecutive subjects who underwent general health examination including abdominal ultrasonography, transient elastography and abdominal fat CT at one tertiary center in Korea were enrolled prospectively. In this study, significant steatosis was diagnosed by ultrasonographic finding and CAP>250 dB/m.

Results:
Multivariate linear regression analysis revealed that VFA was significantly related with CAP, whereas body mass index (BMI) was related with CAP only in univariate analysis. In the multiple logistic regression analysis, VFA (odd ratio [OR], 1.010; 95% confidence interval [CI], 1.001-1.019; P=0.028) and TG (OR, 1.006; 95% CI, 1.001-1.011; P=0.022) were selected as independent risk factor for significant hepatic steatosis. When population was stratified according to VFA ≤100 cm², 100<VFA≤200 cm², VFA >200 cm², patients with a higher VFA were at a greater risk of significant hepatic steatosis with OR of 4.838 (P<0.001; 95% CI, 2.912-8.039) for 100<VFA≤200 cm²; OR of 7.474 (P<0.001; 95% CI, 2.462-22.693) for VFA >200 cm², as compared to those with VFA ≤100 cm².

Conclusions:
Our data demonstrated that VFA was significantly related with significant hepatic steatosis assessed by CAP, suggesting that surveillance of hepatic steatosis need to be performed according the parameter which represents central obesity, not just BMI.
Is sleeve the perfect bariatric procedure for Australia & NZ?

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Australia has traditionally showed reluctance to adopt the more complex bariatric procedures such as gastric bypass and malabsorptive procedures. In New Zealand bypass features more prominently but in terms of overall volume NZ performs considerably less than 10% of the total bariatric caseload in this region.

Our recent love affair with gastric banding has now given way to a major shift towards sleeve gastrectomy, which in 2017 will constitute over 80% of our bariatric work load. Bypass is used as a primary option in less than 10% of our bariatric cases and Fellowship training in this complex technical procedure is hard to obtain locally.

This shift from band to sleeve is essentially on the back of patients and surgeons observing excellent short term outcomes with minimal maintenance and an acceptable risk profile. However recently published long term data reveals an overall failure rate of close to 50% with revision rates around 25%. We have unanswered questions regarding the incidence and management of Barrett’s oesophagus after sleeve and the legacy of the “irreversible bypass” which will constitute most of our sleeve revisions.

Overall, what does the long term sleeve pathway look like for the 130,000 patients who will adopt this procedure over the current decade in Australia & NZ? Have we found the perfect operation for our patients without the need for high volume training or experience in the more technically challenging bypass and malabsorptive options or have we been blinded by our focus on short term outcomes?

Is sleeve a sustainable diabetes treatment?

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Sleeve at the ends of the age bell curve: Good idea? Bad idea? No idea?

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Revision for poor weight loss: any role for resleeve?

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Revision for poor weight loss: does RYGB make sense?

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The hormonal changes following sleeve gastrectomy and gastric bypass are similar. Therefore, how does conversion from SG to GBP provide better weight loss? Perhaps there are variables in their pathophysiology that we are not aware, or we should look to other options.

Revision for poor weight loss - single anastomoses gastric bypass is the answer?

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Sleeve to SADI

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Sleeve Gastrectomy in patients with a BMI of over 50 generally leads to very high rates of insufficient weight loss and late weight regain. There are various methods of revisional surgery to obtain further weight loss. The most effective and invasive has been conversion to Duodenal Switch. Traditional Duodenal Switch procedures have high rates of nutrient deficiencies and alteration in bowel habit. To alleviate these problems and decrease perioperative morbidity, various versions of the SADI procedure (Single Anastomosis Duodeno-ileostomy) have been proposed. I will present the theory behind the development of SADI, evidence following conversion from sleeve gastrectomy to SADI and my experience in this area.

Complications: is reflux really an issue?

Jason Maani
Complications: is reflux really an issue?

Management of surgical and nutritional sequelae in patients with Sleeve Gastrectomy Leaks

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While septic complications after sleeve gastrectomy are heterogeneous in their presentation and clinical course there are certain management principles that, if adhered to can shorten the duration of illness that patients suffer. These can also positively impact on patient health and wellbeing during the recovery phase of their illness and are likely to reduced hospital stay and convalescence.

The surgical strategies involve tiered use of image guided and endoscopic interventions with a plan for early naso-jejunal then per-oral intake. Surgical therapies are used only in patients with free perforations, and TPN only temporarily in patients with ileus or complex fistulae with gut stenosis.

In the cute phase response phase, due to the changes in anatomy and physiology imposed by bariatric procedures, it is nearly impossible to meet the patient’s nutritional requirements. Hence an algorithm on nutrition support is necessary to optimise nutrition and healing.

In this presentation we will detail principles of management that minimizes the trauma of intervention and promotes rapid implementation of nutrition support.

Attrition factors and ethnicity on the preoperative pathway in publically funded bariatric surgery in New Zealand

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Introduction:
Preoperative bariatric surgery attrition has been identified as a barrier to effectively treating individuals with morbid obesity and related co-morbidities. Documented by recent studies, attrition rates can range between 25% and 51% (Sala, Haller, Laferrere, Homel, & McGinty, 2017; Pitzul et al., 2014; Diamant et al., 2014). Previous studies have explored barriers to bariatric surgery in eligible populations, however, few studies have investigated patient attrition once accepted onto a programme.

Methods:
The present retrospective cross-sectional study investigated the database of clients referred for surgery at Auckland City hospital (Auckland, New Zealand) from 2007 – 2016. Patients were categorised into those who were a) declined by the medical team, b) accepted for surgery and completed the surgery, and c) those who were accepted for surgery but withdrew from the programme in the preoperative period. Pathways to attrition were categorised as demographic, medical and client-led. Additionally, a qualitative study is underway to explore in fuller detail the experiences of those most likely to withdraw at this stage.

Results:
The results indicated ethnic disparities in attrition rates with clients of Pacific origin being the least likely to follow through with surgery and clients of Caucasian origin being the most likely to follow through with surgery. Other demographic and medical factors associated with completing surgery included being female and employed. The most frequent client-led attrition pathways included ‘unknown’, ‘disengagement’ and ‘voluntary withdrawal’.

Conclusions:
The results extend existing research by focusing on a population that includes Pacific and Maori ethnic representation. The results will serve as an important basis for further investigation into solutions to decreasing attrition. Qualitative research is suggested as one way to further explore the potential interplay of cultural, social, and medical factors associated with preoperative attrition.

The acquisition of self-care skills post-bariatric surgery is not intuitive.

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Aim:
To determine what specific factors influence success long-term post bariatric surgery.

Method:
Completion of a master’s dissertation was used to explore the current understanding and practice methods to ensure long-term weight maintenance after bariatric surgery.

Discussion:
The benefits and expected outcomes of the first two years following bariatric surgery were well documented. Good quality evidence of what happens after that is not so well known. The literature demonstrated that the ability to change lifelong patterns, thought processes and coping mechanisms after surgery was difficult for all patients post bariatric surgery, even for those who appeared to be flourishing. While the benefits of bariatric surgery were well acknowledged, a strong theme emerged exposing discord between the patients lived experience and the expectations of health professionals. Qualitative studies uncovered a sense that participants felt abandoned by their surgical health professionals. The reviewed literature also revealed gaps in the understanding of how to provide adequate support for post-surgical bariatric patients from the health professionals.

Conclusion:
There is a disconnect between what is required and what is provided for long-term success post bariatric surgery. The call for more ongoing support from professionals in how to make healthy choices when overwhelmed with life was called for, and a desire for longer-term support was clear in the participant feedback.

Fat mass, but not fat-free mass, predicts increased foot pain with morbid obesity, independent of bariatric surgery.

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Background:
Foot pain is associated with obesity. Despite this association, change in foot pain following weight loss has been largely unexplored. This project aims to investigate i) if bariatric surgery reduces foot pain, ii) if baseline body composition predicts change in foot pain.

Methods:
This project was a repeated measures cohort study. Participants with foot pain were recruited from the waiting list of two tertiary hospitals. Measures were taken at baseline and six-month follow-up. Foot pain was assessed with the Manchester-Oxford Foot and Ankle Questionnaire. Body composition was analysed with dual-energy X-ray absorptiometry, from these data fat mass index (FMI) and fat-free mass index (FFMI) were calculated. Within-group changes were analysed with paired samples t-tests or the Wilcoxon signed-rank test. Multivariable linear regression was used to determine predictors of change in foot pain between baseline and follow-up.

Results:
Forty-five participants, 38 women and seven men, with a mean (SD) age of 45.7 (9.4) years were recruited for this study. Twenty-nine participants (BMI = 44.8 (7.0)kg) underwent bariatric surgery, while 16 (BMI = 47.9 (5.2)kg) remained on the waiting-list. Foot pain significantly reduced in the treatment group, from mean (SD) 54.3 (16.4) to 19.8 (18.9), while there was a non-significant change in those who remained on the waiting-list. In multivariable analysis, bariatric surgery was significantly associated with reduced pain at follow-up (B -32.6, 95% CI -43.8 to -21.4), while FMI (B 1.5, 95% CI 0.2 to 2.8), but not FFMI (B -1.4, 95% CI -3.4 to 0.5), was independently associated with increased pain at follow-up, after controlling for age, gender and depression.
Conclusions: Bariatric surgery is significantly associated with reduced foot pain. Higher baseline FMI, but not FFMI, was predictive of increased foot pain at follow-up. Foot pain may be mediated by metabolic, rather than mechanical, factors in bariatric surgery candidates.

Annual Reviews in Bariatric Surgery: Patient Perspectives and Progress
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Background:
A lack of follow-up post-bariatric surgery is associated with lower excess weight loss.1-3 Attrition from follow-up represents a significant problem in many weight loss programs.4 This study sought to explore the qualitative factors which impact upon attendance at annual review following bariatric surgery.

Method:
Of a 12 month (2013/14) cohort of 221 bariatric patients, 167 met inclusion criteria. Open and closed questions on annual review were posed to 41 of the patients by semi-structured telephone interview. Emergent cluster themes were identified and pursued. Attendance at annual review was then cross referenced against weight loss, BMI change, BAROS, AUDIT-C and comorbidity status.

Results:
Patients who attended for their annual review (19 interviewees) spoke about “following the weight loss plan” of the practice, expressed proactive ideas (wanted to be “kept on track,” “catch problems early”), and wanted to “show progress” and receive encouragement from the practice. Patients who did not attend annual review (22 interviewees) spoke about practicalities (time and geography), perceived lack of reminders to attend and having “no issues” to report to medical staff. It was found that patients who did not attend annual review had significantly higher %EWL at 3 years post-surgery (78% [68-89] vs 58% [46-71]; p-value 0.021, Student’s T test) and a significantly lower BMI (29 [27-31] vs 32 [29-35]; p-value 0.037, Student’s T test). No other numerical end points were significant.

Conclusion:
Non-attendees at annual review had lost more weight, had lower BMIs and spoke largely about practicalities barring them from follow-up. We postulate that patients who were progressing satisfactorily with weight loss, without significant issues, were not prioritising follow-up.
Numerical measures were likely impacted by small sample size. Further studies must include larger sample sizes such that numerical end-points can be accurately assessed and qualitative data can be further explored.


Can Preoperative Weight Loss Predict the Outcome of Sleeve Gastrectomy?
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Introduction:
Laparoscopic sleeve gastrectomy (LSG) is currently the most commonly performed bariatric procedure. It has been shown to have good outcomes with relatively low complication rates. There are few studies that look at predicting factors for weight loss outcome after LSG. We propose that weight loss while on very low calorie diet (VLDL) immediately before the operation correlate with one year weight loss outcome.

Aims:
We aim to study variables (including weight loss immediately pre-operation) that can predict weight loss at 12 months post LSG.

Methods:
All primary LSG cases performed between January 2014 and June 2016 with 12 months follow up were included. The outcome measured was weight loss, expressed in the percentage excess weight loss (%EWL) for the preoperative period (VLDL period), first post operative follow up and 12 months follow up. Data was collected retrospectively.

Results:
A total of 179 patients were included in this study. The average %EWL at 12 months follow up was 80% (±27). Weight loss while on VLDL diet did not correlate with weight loss outcome at one year (r= -0.03), however weight loss at first follow up visit (median 32 days) had a moderate positive correlation (r= 0.47).

**Conclusion:**
Weight loss while on VLDL diet immediately pre-operation is not a good predictor for post operative weight loss at one year. It was observed that %EWL at first follow up visit has a better correlation.

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**Nutritional issues following emergency sleeve gastrectomy in a patient with anorexia nervosa and ischaemic stomach**

**Belinda Johnston**, Jonatha Foo, Tom Sweeney, Ahmad Aly

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The sleeve gastrectomy is an established procedure for the treatment of obesity, with the nutritional impacts and dietary management principles being well described in the literature. How do we realign these principles when the patient has anorexia nervosa? An 18 year old woman with a BMI of 14 presented to the Austin with acute gastric dilatation. With the suspicion of gastric ischaemia she was urgently taken to theatre where a large portion of stomach was frankly necrotic. Only the stomach along the lesser curvature and antrum was viable. A gastrectomy fashioned as a sleeve gastrectomy was the only way to maximize stomach preservation. She had an uncomplicated immediate post-operative course. Her early progress at 6 months and the nutritional issues that follow will be discussed.

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“I had weight loss surgery but it didn’t fix me”....when behavioural modification isn’t enough. A novel but fundamental approach to follow-up after weight loss surgery – an evaluation of a revised program in a residential retreat facility in New Zealand

**Andrea M Schroeder**

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**Introduction:**
The Foundations of Healthy Living Retreat was established in 2012 based on a cognitive behaviour therapy-type program with acceptance commitment therapy modules, exercise and nutrition. This was developed to cultivate an ownership of management of a chronic disease by examining not just the physical but the psychological components of obesity. We reflected on outcomes by assessing participant engagement, personal interaction and behaviour changes and revised our program as a result.

**Method:**
Participants were asked to complete feedback each day. This covered: How easy was it to engage in the session and why? How was this relevant/useful to your current situation/s? What was most meaningful during this session and how will you use it afterwards?

We established the participant’s preferred learning style, the most significant thing they would take home from the retreat, if they felt better equipped to deal with stressful situations as a result, and feedback in terms of facilities, program content and meals.

This information was collated and reviewed by the team and revised as necessary.

**Results:**
To do the evaluation, we looked objectively at the feedback forms from the first 25 retreats and developed a facilitator’s manual based on required objectives and learning outcomes for participants. We ascertained what hadn’t worked, what improvements were required and made changes in the following areas:

1. Number of presenters and delivery style
2. Information imparted and learning capabilities
3. Number of participants and length of retreat
4. Program content and flow
5. Learning styles – auditory, visual, kinaesthetic
6. Feedback form effectiveness
7. Program goals and outcomes

**Conclusion:**
The revised retreat program has increased participant engagement, interaction and overall extremely positive feedback. Participants believe that they are now far better equipped to deal with stressful situations, have significant learning with tools and strategies to utilize in their ongoing weight loss surgical journey.
Applying motivational interviewing techniques to assist patients to create new supportive lifestyle behaviours after bariatric surgery

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Background:
One of the major challenges that bariatric surgery clinics face is assisting patients to change lifestyle behaviours that inhibit the long-term effectiveness of bariatric surgery.

Objectives:
To explore the potential role of Motivational Interviewing in facilitating behavioural change in the bariatric surgery setting.

Discussion:
Motivational Interviewing (MI) is a counselling style initially used to treat addictions and recent meta-analyses show that it is effective in creating lifestyle behavioural change. MI has been defined as a person-centred method of guiding to elicit and strengthen personal motivation for change. MI encourages patients to work through their ambivalence about behaviour change and to explore discrepancy between their current behaviour and broader life goals and values. Case studies taken from a 2-year lifestyle support program highlight how MI can be used effectively in the bariatric surgery setting to create positive healthy behavioural changes.

Conclusion:
MI is a tool that could significantly benefit clinics in their interactions with patients to help optimise patient outcomes.

Influence of Bougie size on drinking capacity post sleeve gastrectomy.

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In Laparoscopic Sleeve Gastrectomy (LSG), a bougie is inserted into the stomach to allow for a standardised gastric remnant. There is no general agreement on the size of this bougie or its influence on drinking capacity over time. This may have implications for employment in hot areas or vocations where patients are at risk of dehydration.

Aim:
This, prospective, non-randomised observational trial, examines changes in fluid tolerance to develop a benchmark for fluid intake post LSG and identify differences in 36 and 40Fr cohorts.

Method:
240 patients who have undergone 36Fr or 40Fr LSG. Patients were provided with a 1L bottle and instructed to drink as much standard fluid (room temperature tap water) as possible over a 2 hour period at the eight week, as well as the three, six and twelve month marks post-surgery. Patients were directed to drink to their subjective report of ‘feeling full and unable to drink any more’, using a Likert Scale.

Results:
Of 240 patients who initially enrolled, 152 have completed at least one tolerance assessment (study ongoing). N = 100 36Fr, 52 40Fr, 139 primary surgeries and 13 revisions (10/52 in 40Fr cohort). 11.25% have now completed all phases of the study. The maximum tolerated volumes at 1 and 2hrs increased significantly over time and averaged 863 (36Fr) and 868 (40Fr) mLs/hr by 12 months. There were no differences between median or average intake at any time point for the two bougie sizes. A capacity of 800mls /hr was achieved in both groups by 3 months.

Discussion:
These results will change our preference or concerns about using the slimmer 36Fr bougie for patients working in a hot environment. They confirm that drinking capacity increases over time and should achieve volumes commensurate with safe workplace targets.

A qualitative study of the role of Australian general practitioners in the surgical management of obesity

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Background:
General Practitioners are increasingly managing patients with class 2 and 3 obesity (BMI > 35kg/m² and 40 kg/m² respectively). GPs facilitate access to surgery through referral processes, but the nature of GP involvement in bariatric pre and post-surgery care is currently unclear.

Methods:
This qualitative study involved 10 in-depth interviews with general practitioners (GPs) and 20 interviews with adults who had all undergone laparoscopic adjustable gastric banding (LAGB) for weight management in Tasmania. Interviews were analysed thematically.

**Findings:**

GPs and patients found discussing weight difficult in the absence of related health conditions. For many patients, the functional and social impacts of their weight were their greatest concern. Patients and GPs identified long-term weight loss as the greatest challenge. For patients, seeking a surgical weight loss intervention was driven by their restricted physical capacity as well as an inability to sustain long-term weight loss using lifestyle interventions. For GPs, referral patterns were influenced by previous case experience, accessibility of surgery and patients' financial considerations. Referrals for bariatric surgery commonly occurred at the patient's request or to manage co-morbidity. Post-surgery, there was a lack of clarity around the role of GPs with patients generally preferring the surgical team to manage the LAGB.

**Conclusion:**

Assessing and monitoring physical and social functioning in patients with severe obesity may enhance discussions and facilitate decision making about long-term weight management. Patient preference for surgery, access and comorbidity are key drivers for referral and post-surgical monitoring and support. Greater role clarity and enhanced collaboration between surgeons, GPs and patients following surgery is likely to enhance the experience and outcomes for patients.

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Outcome of laparoscopic sleeve gastrectomy among public and private patients: single institution experience

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**Background:** Laparoscopic sleeve gastrectomy (LSG), is safe and effective, and has established itself as reliable primary bariatric procedure of choice. Although most of the bariatric procedures in Australia are performed in private setting, our institution has a unique set-up where both public and private patients have access to bariatric surgical services. All the procedures were performed by two surgeons with same technique and following standardised preop and postop protocol.

**Aim:**

The aim of this study was to compare the differences in outcome after LSG performed as primary bariatric procedure between public and private patients at our institution.

**Method:**

Data was collected prospectively, using prospective online data registry, of all patients undergoing LSG as primary bariatric procedure between January 2015 to December 2015 at Joondalup Health Campus. Outcomes analysed were in terms of body mass index (BMI), percentage excess weight loss (%EWL) and comorbidity resolution. Surgical success was defined as %EWL >=50 at 12 month follow up.

**Results:**

A total of 276 primary LSG were performed during the study period; 154 public and 122 private patients. The mean BMI at surgery was 49.5 and 43.3 [p-value 0.010]. Out of 276 patients, 178 attended follow up at 12 month, 98 (63.6 %) public and 80 (65.5%) private. Mean % EWL at 12 month follow up was 74.45 and 82.19[p-value 0.103]. Co morbidity resolution was not statistically significant between the two groups.

**Conclusion:**

LSG is effective bariatric procedure associated with significant weight reduction and in our study there was no significant difference in outcomes between the public and private patients.

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Social marketing in obesity prevention: the example of ‘livelighter’

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3. Cancer Council Western Australia, Perth, WA, Australia

**Background:**

Mass media campaigns can positively influence health behaviours. The LiveLighter campaign graphically illustrates negative health effects of overweight and recommends alternatives to obesogenic behaviours. It was developed and launched in Western Australia (WA) in 2012 and launched in Victoria in 2014.

**Methods:**

The WA evaluation employed a pre-post design, with cross-sectional tracking surveys (n=1,000) across three Phases of the campaign: ‘Toxic fat’, ‘Sugary Drinks’ and ‘Junk food’. The Victorian evaluation employed a pre-post evaluation design with a control group (South Australia) for Phases one and two (n=700 per condition per survey).

**Results:**
Phase one was associated with increased knowledge of the health consequences of overweight in WA (63% cf. 71%; p<0.05) and Victoria (56% cf. 76%; p<0.05). Following Phase two, the message about reducing sugary drink consumption impacted frequent consumers in WA (4+ times/wk: 22% cf. 16%; p<0.05) and Victoria (4+ cups/wk: 31% cf. 22%; p<0.01), and overweight weekly consumers in WA (1+wk: 56% cf. 48%; p<0.05). In WA, cross-sectional trends also show consumption of sugary drinks (1+/wk: 60% cf. 46%; p<0.001) and fast food (1+/wk: 62% cf. 54%; p<0.05) have reduced since the campaign launched. Phase three showed increased public support in WA for improving nutritional disclosure on food packaging (84% cf. 89%; p<0.05) and menu boards (87% cf. 91%; p<0.05), and a tax on soft drinks (72% cf. 79%; p<0.05).

Conclusions:
The first phase of LiveLighter set the agenda and succeeded in promoting awareness and motivation for achieving a healthy weight and lifestyle. The second phase showed evidence of behaviour change with reduced SSB consumption. At Phase three LiveLighter was associated with increased support for public policies favourable to reducing obesity. Overall, LiveLighter delivers a comprehensive program with advertising aired at sufficient intensity to achieve change.

Use of traditional, online and social media in public communication campaigns to change preventive health behaviours

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A strong case has always been needed for government investment in mass-reach behaviour change media campaigns. With further tightening of government budgets and the exploding use of online and social media, there has been keen interest in pursuing online and digital media channels to deliver behaviour change. This presentation will first examine trends in Australians’ use of and engagement with traditional, online and social media, and then explore via case studies the extent to which we may be able to both reach and impact target audiences with these different media channels.

The case for restricting food marketing and sponsorship

Wendy Watson¹
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Reducing children’s exposure to unhealthy food marketing has been recognised by the World Health Organization as an important strategy for the prevention of obesity-related chronic disease. In 2009 the Australian food industry introduced two voluntary self-regulatory initiatives on food marketing to children. In 2010 the government committed to monitoring the impact of the self-regulatory initiatives, in response to the Australian National Preventative Health Taskforce recommendation to phase out the marketing of energy-dense nutrient-poor foods on television before 9pm. However, no formal government monitoring has been conducted.

The presentation provides a critique of the present situation in Australia including the major loopholes in the self-regulatory initiatives, illustrated by examples of advertising and unsuccessful complaints lodged through the industry framework. It also presents some recent evidence of the extent of advertising in Australia. We discuss community support for restrictions and how advocacy is being used to call for policy action on food marketing to children.

We explore developments and initiatives from other countries and the growing evidence-base on the effect of food marketing on children. We look at the options available to address the issue including through regulatory changes.

Sugary drink consumption: It's time to address attitudes, beliefs and associated behaviours

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Introduction:
Sugary drinks contribute excess added sugars to the diet, potentially leading to weight gain and obesity. Australians are high consumers of sugary drinks so interventions to reduce population-level consumption would produce public health benefits. To
address population-level consumption of sugary drinks, it is important to establish what the Australian community currently knows about sugary drinks, and what attitudes, beliefs and behaviours are associated with higher levels of sugary drink consumption.

Methods:
A national survey was conducted with adults aged 18 years and over to explore sugary drink consumption and associated knowledge, attitudes and behaviours. The survey was administered using Computer Assisted Telephone Interviews and occurred between February and April 2017. Random digit dialling of landline and mobile phones was used to obtain a nationally representative sample of 3430.

Results:
Preliminary results show that almost half of the sample consumed sugary drinks at least weekly and 14% consumed them at least daily. Consumption was higher among males (19% daily; 56% weekly) compared to females (8% daily; 40% weekly) and those aged 18 to 30 years (17% daily; 67% weekly) compared to older age groups (13% daily; 41% weekly). Each increase in consumption from none to non-daily to daily corresponded with higher rates of availability of sugary drinks at home, shift-work, takeaway consumption, and perceiving family, friends and peers as regular consumers. Daily consumers were less likely than none and non-daily consumers to be aware of health risks linked to sugary drink consumption.

Conclusion:
There is a high consumption of sugary drinks among Australians, particularly young adult males. This and interventions aimed at de-normalising consumption practices and increasing knowledge about the health risks associated with sugary drink consumption are warranted. The identification of risk factors associated with the behaviour provide the opportunity for targeted interventions.

Public vs. expert opinion: what’s healthy eating?
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2. Cancer Council Victoria, Melbourne, Victoria, Australia

Background:
Knowledge deficits may impede healthy eating. Provision of adequate nutrition information is associated with consumption of healthier food choices.

Aim:
To assess whether there is a disparity between what foods, beverages and dieting practices the public versus nutrition experts view as healthy.

Methods:
A cross-sectional on-line survey of 1,097 adults 18-64 years (‘public’) and 134 professional dietitians and nutritionists (‘experts’) in Victoria, Australia assessed perceptions of which foods and beverages are considered healthy, dieting practices and perceptions of how healthy such practices are, and what factors to consider when making a healthy choice. Differences in perceptions and practices between the samples were assessed using chi-square tests.

Results:
There were large discrepancies in which foods the public and expert samples considered healthy. Coconut oil, orange juice, Caesar salad, Nutri-grain cereal and gluten free cake had the greatest percentage point difference between the samples, with the public more likely to consider these foods as healthy. Despite 70% of the public reporting diets containing only some or almost no nutritious, healthy foods, 78% believe their overall diet is healthy and 61% place no rules or restrictions on items consumed. Of the public who reported undertaking dieting practices, low-fat, sugar-free and low-carb diets were the most common, and the public were more likely than experts to perceive sugar-free and low-carb diets as healthy. Experts were more likely to report a Mediterranean diet and following the Australian Dietary Guidelines as healthy and more likely to be undertaking these dietary practices compared to the public. Personal judgement of products was considered important by both samples when making healthy choice decisions.

Conclusions:
If public perceptions surrounding healthier eating are flawed, personal attempts to improve diet may be missed or unsuccessful. Greater efforts should be made to align Victorian adults’ health perceptions with those of experts.

Obesity – getting to the guts of the problem
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The gut with its considerable surface area, significant microbial mass and recognised associations with immune and neuroendocrine tissues is much more than just a surface for nutrient absorption. In this context, the contribution of the gut to the development of obesity deserves further attention. Among the many functions of the intestinal microbiota, microbial fermentation of otherwise nondigestible fibres provides an additional source of absorbable of energy to the host (up to 10% of daily energy intake has been suggested) and is therefore particularly relevant in the context of obesity. Changes in the gut microbiota reported in human studies of excess body mass include reduced overall microbial diversity and differences in the
JOINT SCIENTIFIC MEETING

Contributions of gut motor and hormone functions to regulate food intake in humans

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As the first point of contact for ingested nutrients, the upper gastrointestinal (GI) tract plays a key role in sensing the characteristics of the ingested meal content and in signaling this information to the brain. The interaction of nutrients with small intestinal nutrient-sensing receptors also triggers the release of gut hormones and initiates feedback loops that lead to adjustments in the rate of gastric emptying, both of which are involved in the regulation of energy intake. Lipid has potent effects on these functions, requiring fat digestion and fatty acids with a chain length of >12 carbon atoms. Dietary modifications can influence these effects of fat, so that overconsumption of a high-energy, high-fat diet reduces, while energy restriction enhances, the sensitivity to the GI and appetite-suppressant effects of fat. Moreover, obesity is associated with compromised GI responses to dietary fat. Dietary protein, particularly whey, is also considered to be a highly satiating macronutrient, an effect that is, in part, mediated by changes in GI functions, although protein appears to have less potent effects to activate GI functions than lipid. In contrast to lipid, the appetite-suppressant effects of protein appear to remain intact in obesity, so that both isocaloric intraduodenal infusions of protein, or ingestion of a high-protein meal, reduce subsequent energy intake, in both lean and obese individuals. Such findings are consistent with the efficacy of high-protein diets to achieve significant weight loss. Interestingly, our recent research, investigating the potential role of specific amino acids in mediating the effects of protein on GI functions and energy intake, has established that certain amino acids, e.g. L-tryptophan and L-leucine, suppress subsequent energy intake, in excess of their own energy content, despite diverse, and relatively modest, or no, effects on GI functions. In contrast, their effects on energy intake were more closely related to their respective plasma concentrations, suggesting that the energy intake-suppressant effects of these amino acids, and protein, may be mediated not primarily by GI effects, but through effects of circulating amino acids. Taken together, the role of the gut in mediating the energy intake-suppressant effects of dietary nutrients appears to vary according to macronutrient class. Moreover, the adaptive changes in GI function that occur in response to a high fat intake may, at least in part, underlie the obesogenic properties of fat.

How the gut talks to the brain

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Understanding gastrointestinal regulation of appetite drives offer a view on a therapeutic window for obesity which promises better clinical benefits as well as lower side effects. Bariatric surgery is a good model to investigate appetite reduction in humans and rodents, because it provides major changes in appetite with subsequent weight loss maintenance. Gastric bypass, but not gastric banding cause increased postprandial PYY and GLP-1 favouring enhanced satiety. An early and exaggerated insulin response mediates improved glycemic control. The rodent model of bypass show elevated PYY, GLP-1 and gut hypertrophy compared with sham-operated rats. Moreover, exogenous PYY reduced food intake while blockade of endogenous PYY increased food intake. A prospective follow-up human study of gastric bypass showed progressively increasing PYY, oxyntomodulin, and GLP-1 responses associated with enhanced satiety. Blocking these responses in animal and human models leads to increased food intake. A paradoxical increase in energy expenditure after gastric bypass secondary to the enhanced postprandial energy expenditure is evident in both humans and rodents. Changes occur in the sensory, reward and physiological domains of taste that may mechanistically contribute to the alterations in food preferences after gastric bypass. The sustained nature of weight loss, reduced appetite and shifts in food preferences may be explained by gut adaptation and chronic hormone elevation, especially as blockade of the gut hormones result in enhanced appetitive behaviour. Glycaemic control improves rapidly and is a result of several mechanisms including reduction in calorie intake, weight, hepatic and peripheral insulin resistance as well as an enhanced insulin secretion. Significantly altered gut hormones, bile acid metabolism and gut microbiota alterations have been implicated. Finally the improved metabolic milieu results in end organ damage reversal in some patients. Following gastric bypass, pleiotrophic responses from the gastrointestinal tract may contribute to improved appetite reduction, long-term lowering of body weight, glycemic control and improvements in end organ damage.

Augmented capacity for intestinal serotonin release in obese subjects
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Recent evidence from animal studies supports a role for serotonin (5-HT), derived from gut enterochromaffin (EC) cells, in regulating hepatic glucose production, lipolysis and thermogenesis. Evidence in humans is limited, although elevated plasma 5-HT concentrations have been linked to obesity.

We assessed (i) plasma 5-HT concentrations before and during intraduodenal glucose infusion (4 kcal/min for 30 min) in obese non-diabetic (BMI 44 ± 4 kg/m², N=14) and control (BMI 24 ± 1 kg/m², N=10) subjects, (ii) functional activation of duodenal EC cells (co-immunodetection of phospho-extracellular related kinase, pERK) in response to glucose, and in separate subjects, (iii) expression of TPH1 (encoding tryptophan hydroxylase-1, the rate limiting enzyme in 5-HT synthesis), in duodenum and colon (N=39), and (iv) 5-HT content and glucose responses of primary EC cells isolated from these regions (N=85).

Plasma 5-HT was positively related to BMI in fasted obese and control subjects (P ≤ 0.05), and was higher in obese than controls before (1.7-fold, P ≤ 0.05), and during (2.7-fold iAUC, P ≤ 0.01) intraduodenal glucose infusion. Duodenal EC cell density was two-fold greater in obese than controls (P ≤ 0.01), while the proportion showing glucose-dependent activation (pERK labelling), and the 5-HT content of duodenal and colonic EC cells, were similar. TPH1 expression was similar in duodenum and colon in control subjects, but 40% higher in the duodenum of obese subjects (P ≤ 0.05), with expression correlating positively to BMI (P ≤ 0.001). Examination of the nutrient responsiveness of human EC cells demonstrates that duodenal and colonic EC cells respond to glucose but not fructose.

Obese subjects have increased capacity to produce 5-HT in the proximal small intestine, and augmented glucose-stimulated 5-HT release. Gut-derived 5-HT is potentially important in the pathogenesis of obesity.

Equivalent improvements in glycaemic variability in mildly obese Asian patients with diabetes treated with Roux-en-Y Gastric Bypass or GLP1 Receptor Agonist.

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Glycaemic variability (GV) is implicated in microvascular and macrovascular complications. We sought to compare the impact of Roux-en-Y gastric bypass (RYGB) versus Glucagon-like peptide-1 receptor agonist (GLP1-RA) therapy on GV as determined by retrospective continuous glucose monitoring (CGM).

In this prospective RCT of RYGB against GLP1-RA (using GLP1-RA) in Asians within BMI 27-32 kg/m² with suboptimally controlled Type 2 Diabetes (HbA1c≥8%), CGM was performed at baseline and 6 weeks. GV parameters, calculated using online tool (easyGV®,) included standard deviation (SD), mean amplitude of glycaemic excursions (MAGE), continuous overall net glycaemic action (CONGA), low and high blood glucose index (LBGI and HBGI) and glycaemic risk assessment diabetes equation (GRADE). HbA1c and weight were measured at baseline and 3 months.

Twenty patients were randomized to the medical and surgical arm (N=10 in each arm). Age (meansD) was 44.3±11.6 years and diabetes duration 5.8±2.9 years. There were no differences in baseline HbA1c, fasting plasma glucose, body mass index (BMI), diabetes duration and insulin use. Baseline CGM glycaemic profiles of mean glucose, SD, MAGE, CONGA, LBGI, HBGI and GRADE was similar between groups. At 6 weeks, both groups had reductions in mean glucose, SD, CONGA, HBGI and GRADE. For GRADE, the medical group resulted in greater reduction (6.6±1.4 to 4.4±1.6, p=0.03) compared to the surgical group (6.9±1.7 to 5.0±2.6, p=0.071). Notably, there was no difference in LBGI between the groups. Overall HbA1c and BMI reduction was greater in the surgical (HbA1c 9.8±1.4 to 6.1±0.4%, p<0.001; BMI 29.3±1.7 to 24.2±2.1, p<0.001) than the medical group (9.0±0.9 to 6.8±0.9%, p=0.001; BMI 29.6±1.5 to 28.7±1.2, p=0.004; p=0.014 and p<0.001 for difference in HbA1c and BMI reductions respectively between surgical and medical groups.

In mildly obese Asian diabetes patients, although RYGB is superior to medical therapy in improving HbA1c and weight, medical therapy with GLP1-RA is equivalent to RYGB in reducing GV without increasing LBGI.

Impact of weight loss on health-related quality of life, as measured by SF-36 in the SCALE Obesity and Prediabetes trial of liraglutide 3.0 mg: 3-year data

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Increasing NAD biosynthesis to improve metabolism

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Nicotinamide adenine dinucleotide (NAD) has been recognised as a critical co-factor in redox reactions for nearly 100 years. In recent times however, NAD has been linked with many other processes (e.g. intermediary metabolism, circadian rhythms, cell differentiation) via its role as a co-substrate for different enzymes, including the sirtuin family of deacylases. NAD levels are reduced in states of metabolic dysfunction (e.g. obesity, old age) and interventions that increase NAD levels, such as the provision of NAD precursors, appear to induce favourable metabolic outcomes. In this seminar I will discuss our recent studies using genetic and pharmacological approaches to investigate how changes in NAD biosynthesis influence metabolic defects that occur during the development of obesity.

Do artificial sweeteners impact glycaemic control in healthy humans?

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Background:
Epidemiological studies indicate that a high habitual intake of non-caloric artificial sweeteners (NAS) increases the risk of type 2 diabetes (T2DM), but the mechanisms are unknown. NAS exposure acutely activates intestinal sweet taste receptors (STRs) to release glucose-dependent insulinotropic polypeptide (GIP) from proximal K-cells, and glucagon-like peptide-1 and 2 (GLP-1, GLP-2) from distal L-cells in animals, while chronic NAS exposure augments glucose absorption and increases postprandial glycaemia. It is not known whether NAS alters glucose absorption or postprandial glycaemia in humans.

Methods:
27 healthy lean subjects (age 27 ± 2 years, 14 male) were randomised, in double-blind fashion, to NAS supplementation (92 mg sucralose + 52 mg acesulfame-K, N=14) or placebo (N=13), taken in capsules three times daily before meals over 2 weeks. Fasted subjects underwent endoscopy incorporating a 30 min intraduodenal glucose infusion (30g/150ml, 3 kcal/min, including 3g of the glucose analogue 3-O-methyl glucose, 3-OMG), and biopsy collection, before and immediately after the intervention. Glucose absorption (serum 3-OMG), plasma glucose, insulin and gut peptides (total GLP-1, GLP-2 and GIP) were measured over 120 min.

Results:
NAS supplementation augmented glucose absorption (23%, P ≤ 0.05) and blood glucose during enteral glucose (27%, P ≤ 0.05), and attenuated GLP-1 release compared to baseline (35%, P ≤ 0.05); none of these measures were altered with placebo. GIP responses were similar between groups, while GLP-2 and insulin were lower at 40 and 60 min in the NAS group (37% for both vs. baseline, P ≤ 0.05).

References:
1. The University of Adelaide, Adelaide, SA, Australia
NPY neurons mediate the effects of chronic CNS insulin infusion on energy balance

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Insulin signalling in the central nervous system is involved in the control of energy balance and glucose homeostasis. However, it has previously been observed that ablation of insulin receptors in the AgRP or POMC neurons that regulate energy homeostasis are dispensable in maintaining normal energy balance. We have recently demonstrated that NPY-specific insulin signaling regulates food intake and energy expenditure, and lack of insulin signaling in NPY neurons leads to increased energy stores and an obese phenotype(1). Here we examined the effects of infusion of different insulin formulations into the CNS and periphery of mice lacking NPY-specific insulin signaling. Chronic CNS NPH insulin infusion reduced in food intake, body weight and fat mass in wildtype animals, no changes in energy balance were observed in mice lacking NPY-specific insulin signaling. Peripheral chronic NPH insulin infusion led to weight gain in both wildtype mice and mice lacking insulin signaling in NPY cells, while insulin detemir inhibited weight gain in wildtype but not mice lacking NPY-specific insulin signaling. Peripheral NPH insulin or insulin detemir infusion led significantly more phosphorylation of Akt in both wildtype mice and mice than lacking insulin signaling in NPY cells. Together these data support the hypotheses that NPY neurons mediate the effects of CNS insulin on energy balance and that ability of insulin detemir to inhibit weight gain is mediated by activity at NPY neurons.

Three groups of mice were housed at thermoneutrality (29°C) and fed a chow (20% protein, 11% fat, 69% crude carbohydrate), high starch (Hi-ST; 20% protein, 20% fat, 60% corn starch) or high fat diet (Hi-F; 20% protein, 60% lard, 20% corn starch). Body weight, body composition (EchoMRI), glucose tolerance (oGTT) were monitored and after 20–25 weeks of diet mice from each group underwent a hyperinsulinaemic-euglycaemic clamp with tracers to determine whole body and tissue specific glucose metabolism. In a separate cohort, mice were fed for 4 weeks and injected with $^3$H-H$_2$O to measure de novo lipogenesis (DNL).

Both Hi-ST and Hi-F diet mice acquired significantly more fat than chow-fed mice. Despite similar adiposity, Hi-ST mice had better oGTT than Hi-F mice and were similar to chow mice (p<0.05). During the clamp, Hi-ST mice had similar glucose infusion rates (GIR) to chows while Hi-F mice were insulin resistant (decreased GIR; Chow 36.4±2.7; Hi-ST 30.7±2.8; Hi-F 21.1±1.9 mg/kg lean mass/min p<0.05), Hi-ST had better suppression of HGO than Hi-F mice and Hi-ST mice did not exhibit any reduction in skeletal muscle glucose uptake (chow 25.8±3.4; Hi-ST 18.6±1.6; Hi-F 13.9±1.3 μmol/100g/min). Liver DNL was increased in the Hi-ST group while the Hi-F mice DNL was suppressed (chow 20.5±1.4; Hi-ST 35.7±3.8; Hi-F 14.5±1.1 μmol $^3$H$_2$O/h).

These results indicate that despite development of significant obesity, mice fed a Hi-ST diet display a different pattern of glucose tolerance and insulin sensitivity to similarly obese mice fed a Hi-F diet. The Hi-ST model offers new opportunities for investigating mechanistic links between obesity and reduced insulin action.

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**Presidents Paper: Long-term outcomes after bariatric surgery including 20 year data on gastric banding**

Paul O’Brien¹

1. Monash University, Melbourne, VIC, Australia

Presidents Paper: Long-term outcomes after bariatric surgery including 20 year data on gastric banding

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**Band to sleeve to bypass. Reasons and outcomes.**

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**Background:**
The aim was to review individuals undergoing a third bariatric procedure within a single institution and identify common indications for doing so. Multiple or subsequent procedures are becoming more common and individuals seeking further surgical intervention for various issues is also increasing.

**Methods:**
A prospective bariatric database was analysed to review all patients who had undergone gastric banding, conversion to sleeve gastrectomy followed by a further conversion to gastric bypass. Presenting reasons and symptoms were looked at as well as their weight progress and complication rate.

**Results:**
A total of 26 individuals within this centre underwent gastric bypass as a revisional procedure after sleeve gastrectomy, the first subsequent procedure after gastric banding (the primary procedure). Most individuals were referred from other centres for their third separate procedure. Reasons for seeking removal of gastric band and progression to sleeve were lack of weight loss, vomiting, reflux, food intolerance, eroded or slipped band. A combination of symptoms was common. Median time frame between surgeries was 4 years. Reasons for progressing from sleeve to gastric bypass included weight regain, reflux, stricture, inadequate restriction, and anatomical issues such as large or dilated fundus. Time frame between second and third procedure was 2 years. Median BMI at primary procedure was 47kgm2, 43 at time of sleeve and 41 at time of bypass. There is a 50% early complication rate after the final conversion to gastric bypass, compared with 28% for band to bypass and 31% for sleeve to bypass procedure.

**Conclusion:**
It is safe to say that individuals seeking a third procedure are experiencing multiple symptoms and halted weight loss. Conversion surgeries are only undertaken when all other options such as diet and behaviour modification are exhausted. Endoscopic procedures to address symptoms and lack of weight loss should also be considered.

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**Establishment of a bariatric surgery clinical quality registry**

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The prevalence of obesity continues to rise in Australia and New Zealand. Bariatric surgery is offered as a means of providing predictable and sustainable weight loss. A clinical quality registry began in 2012 to track the safety, efficacy and outcomes of bariatric surgery.

**Aim:**
To record the immediate, and to study longitudinally, the safety and efficacy of bariatric surgery in Australia and New Zealand, as well as track key health changes following bariatric surgery.

**Methods:**
Submission of data to the registry was done online or by hard copy. Data collected included patients’ demographics, height, weight, diabetes status and treatment, type of bariatric procedure, devices used, surgical complications, and mortality. Patients who did not opt out after receiving explanatory statements had their outcome measures recorded peri-operatively (20-90 days post-operation) and annually thereafter.

**Results:**
As of 30 June 2016, 16,577 bariatric procedures were recorded from 15,643 Australian patients. New Zealand surgeons were not able to contribute due to ethics in progress. The mean age of the patient cohort was 44.2 years and mostly female (79%). The death rate was 0.04%. In the perioperative period, defined adverse events (readmission to hospital, return to theatre or ICU admission) were recorded in 2.1% of primary procedures and 5.3% of revision procedures. Excess weight loss of 55.7% was reported at one year follow-up, 51.2% at two years, and 51.8% at three years. Amongst patients with diabetes at baseline, 38% required no medication after one year and those requiring insulin dropped from 23% to 10%. However, this follow-up data was under-reported.

**Conclusion:**
These initial data are promising, confirming the efficacy and safety of bariatric surgery at a community level in Australia. Increased participation rates will reduce the risk of bias and allow for more robust conclusions.

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**Endoscopic Sleeve Gastroplasty for weight loss: efficacy and safety**

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**Background:**
Endoscopic bariatric techniques have emerged as effective therapies in the management of obesity. Endoscopic Sleeve Gastroplasty (ESG) is an incisionless transoral endoscopic procedure whereby a gastric luminal sleeve is fashioned by application of a series of transmural sutures placed along the greater curvature of the stomach resulting in a reduction in functional volume by approximately 75%. The study aimed to examine the efficacy and safety of ESG for weight loss.

**Methods:**
44 obese patients with mean age 42 years and mean body mass index 37.4 kg/m\(^2\) underwent ESG, 35 as a primary bariatric procedure and 9 as a consequent procedure after intragastric balloon placement. All procedures were conducted as day-only/outpatient cases and were provided with protocolised IV infusion support and dietitian and psychologist support post procedure. Primary outcomes included total weight loss (kg), proportion of total body weight loss (TBWL, %), excess weight loss (EWL, %), ΔBMI (kg/m\(^2\)), and immediate and delayed complications at 1 and 3 months post procedure.

**Results:**
Total weight loss was 10.8±3.9 kg at 1 month (TBWL 10.9±2.9%; EWL 32.6±11.1%; ΔBMI 3.8±1.2) and 13.6±5.9 kg at 3 months procedure (TBWL 12.6±4.2%; EWL 40.2±15.7%; ΔBMI 4.8±1.9). Weight loss was similar in patients who underwent ESG as a primary bariatric procedure when compared to those who had previously had an intragastric balloon. Number of dietitian visits post procedure was associated with significantly greater weight loss by 3 months post-procedure (P<0.001). There were no major intraprocedural or post-procedural complications. The most commonly reported early adverse events included cramping abdominal pain (34%), nausea (18%) and reflux (18%). These were well managed by use of appropriate pharmacologic agents and resolved within the first week in 90% of patients.

**Conclusion:**
These results lead us to consider ESG as a safe and effective endoscopic outpatient procedure for weight loss without significant complications.

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**Public hospital admissions and emergency department presentations for patients wait-listed for public bariatric surgery in Tasmania, Australia: a state-wide cohort study**

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3. Department of Health and Human Services, Hobart, TAS, Australia

**Background:**
Increased demand for bariatric surgery creates prolonged wait-list times, and increases burden on public healthcare. The long-term influence of bariatric surgery on hospital admissions and emergency department (ED) presentations is under-investigated.
Aims:
To determine public hospital services utilisation (hospital admissions, ED presentations) in patients wait-listed for bariatric surgery before and after surgery or wait-list removal, and to identify hospital admission reasons associated with drop-out.

Methods:
All Tasmanians waiting for publicly-funded primary bariatric surgery from 2008 to 2013, their hospital admissions and ED presentations episodes were identified and extracted using administrative datasets. Episodes were assigned to 3 periods: before wait-list, while waiting, and after a bariatric operation or drop-out.

Results:
648 wait-listed patients had 3,161 public hospital admissions in 2006-2014 and 4,928 ED presentations in 2000-2014. During the wait-list period, the hospital admission rate differed significantly between operated and dropped-out patients (44.9 vs 64.2 per 100 person-years, p<0.01). Mental health problems, poisonings, injuries and renal disorders while on the wait-list were associated with drop-out.

Hospital admission rates increased post-surgery (from 44.9 to 64.2 per 100 person-years, p<0.01). Operated patients presented to the ED more frequently than dropped-out patients in the post-wait-list period (78.9 vs 60.1 per 100 person-years, p<0.05). The likelihood of being admitted from the ED increased after the operation from 31.6% to 39.1% (p<0.05) of presentations.

Conclusions:
Certain conditions were associated with wait-list drop-out. While bariatric surgery has many health benefits, it was not associated with fewer hospital admissions or ED presentations in the Tasmanian public hospital system.

Oesophageal manometry is a valuable tool in the investigation of adverse symptoms in post-bariatric patients

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Introduction:
In Australia, over 15,000 bariatric procedures are performed annually. Following bariatric surgery, some patients may develop problematic dysphagia, reflux or regurgitation. A number of investigations are available to investigate these symptoms, including anatomical studies and oesophageal manometry. The utility of manometry in this setting is yet to be defined.

Methods:
A retrospective review was performed of post-bariatric patients with adverse symptoms undergoing high resolution manometry at a single bariatric practice between 2012 and 2016. The data collected included: patient demographics, the indication for the investigation, peristaltic activity, lower oesophageal sphincter function, and presence of hiatus hernia. Most patients undergo anatomical studies including endoscopy hence the use of gastroscopy and the presence of significant findings was recorded.

Results:
71 patients were included in this study - 16 post-laparoscopic gastric band, 28 post-sleeve gastrectomy, and 27 post-bypass. The main symptoms being investigated were reflux, or regurgitation (n=38), and dysphagia (n=20). 76% of patients with reflux or regurgitation, and 65% with dysphagia had some form of manometric abnormality. Within the reflux group, there were 21 findings of abnormal oesophageal peristaltic function and 18 of lower oesophageal sphincter (LOS) dysfunction, while in the dysphagia group, there were 12 findings of oesophageal dysmotility and 5 of LOS dysfunction. Gastroscopy was performed in 25 reflux patients, and 20 dysphagia patients, with an endoscopic abnormality seen in 48% and 40% respectively.

Conclusions:
In this cohort of symptomatic bariatric patients, the use of manometry to investigate post-operative symptoms identified abnormal findings in a large proportion of patients. The use of endoscopy yielded a lower rate of abnormal findings. These findings indicate that manometry may be a useful tool to detect functional disorders in symptomatic patients following bariatric surgery that may be missed by endoscopic examination.

A Systematic Review of The Role of Gut Microbiota In Bariatric Surgery: Prognostic And Therapeutic Implications

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There has been a significant paradigm shift surrounding the mechanism of action of metabolic surgery. Building upon initial presumptions of purely restrictive or malabsorptive effects of surgery, there followed a legion of research into the hormonal aspects. However more recently a nascent base of evidence has formed focused upon the role of the gut microbiota via bile acid changes in obesity pathophysiology.
We present the findings of a systematic review into the gut microbiota profiles after bariatric surgery in both murine and human patients. Databases of PubMed, CINAHL, Embase and Cochrane Central library were searched. Animal studies suggest after SG (sleeve gastrectomy) and RYGB (Roux-en-Y Gastric Bypass) the percentage of Proteobacteria in the SG and sham groups remain markedly lower than the RYGB group. Sham surgery rats showed higher levels of *Escherichia coli*. Two cross-over studies trialled colorising germ-free mice with stools from postoperative mice. The surgically-altered faecal microbiota promoted reduced fat deposition and consequent weight loss in recipients. By comparison, small studies of human faecal samples indicated specific bacterial genera positively correlated with weight loss (particularly *Faecalibacterium* and *Enterococcus*). RYGB was associated with a relative abundance of *Firmicutes* whilst SG resulted in increased *Bacteroidetes* phyla. There is a significant difference between sleeve gastrectomy and Roux-en-Y gastric bypass patients.

The area of the gut microbiome is a promising area of both diagnostic and therapeutic research. Unfortunately to-date the observational trials have been limited by a lack of standardisation in early studies, technical limits of earlier sequencing methods and heterogeneity of surgical procedures. A large-scale cohort trial observing the changes in faecal microbiota is necessary to adequately characterise the changes in the gut microbiota. Further determination of the optimal gut microbiota may provide guidance towards therapeutic measures to improve efficacy and durability of weight loss in reaching metabolic goals.

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**Laparoscopic Silastic Ring Mini Gastric Bypass (SR-MGBP): up to 11 year results from a single centre**

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**Purpose:**
Bariatric surgery has well established efficacy in treating obesity and its related comorbidities. The laparoscopic mini-gastric bypass (MGBP) represents a simpler alternative to a Roux-en-Y gastric bypass (RYGBP). The placement of a silastic ring (SR) may enhance weight loss and minimize weight regain. This study reports long term results from a cohort of patients undergoing a SR-MGBP.

**Materials and Methods:**
Long term outcomes (upto 11 years) in a cohort of patients undergoing surgery between August 2005 and January 2008 were analysed. A combination of questionnaires and electronic hospital records were used to assess weight loss, comorbidity resolution and complications.

**Results:**
156 patients underwent surgery. 92 patients responded to the questionnaires. Computer based hospital information was available on 139 patients. Mean percent excess weight loss (%EWL) at 11 years was 84.3%. Comorbidity resolution and co-morbidities. The laparoscopic mini-gastric bypass (MGBP) represents a simpler alternative to a Roux-en-Y gastric bypass (RYGBP). The placement of a silastic ring (SR) may enhance weight loss and minimize weight regain. This study reports long term results from a cohort of patients undergoing a SR-MGBP.

**Conclusions:**
SR-MGBP appears to be a safe and effective operation for the morbidly obese. The SR problems can be managed easily and is reasonable to consider when performing a MGBP. Concerns about bile reflux appear to be well founded and some patients require revision.

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**One Anastomosis Gastric Bypass (OAGB) with insertion of the MiniMizer® Ring (MMR); early results.**

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**Background:**
OAGB is a safe and effective primary and revision bariatric procedure. The safety of the addition of a MMR to improve durability of weight loss is unreported following OAGB.

**Objectives:**
To review early results of the safety of insertion of a MMR during primary and revision OAGB.

**Methods:**
Retrospective analysis of our prospective database from March 2015 to June 2017. Revision OAGB was performed as a single stage procedure (in all but 1 patient) following a non-responding first restrictive procedure; including gastric band or sleeve gastrectomy. We assessed early (within 30 days) and late morbidity and mortality.

**Results:**
We identified 137 patients who underwent OAGB. Eighteen patients had OAGB + MMR: primary OAGB + MMR (n = 5; mean age 41 years, 4 female, 1 male, mean BMI 51.4 kg/m²), single-stage revision surgery to OAGB + MMR (n = 12; previous...
gastric band = 5; previous sleeve gastrectomy = 7; mean age 44 years, all female, mean BMI 44.3 kg/m²) and 2-stage revision surgery from band to OAGB + MMR (n = 1; age 38 years, female, BMI 57 kg/m²). One patient re-presented following primary OAGB + MMR with dysphagia and functional hold up at the MMR. Three patients re-presented following revision OAGB + MMR; intractable bile acid reflux requiring conversion to RNYGP (n = 1); small bowel obstruction with port site hernia (n = 1) and dysphagia secondary to stenosis at the gastro-enterostomy (n = 1). There were no deaths. No patients required removal of MMR following a median follow up period of 6 months.

Conclusion:
Our early results suggest MMR can safely be inserted at the time of primary or single-stage revision OAGB.

Public bariatric surgery - Viability & outcomes

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Background:
Access to public hospital bariatric surgery is limited. There is comparatively little data available on outcomes of surgery in the public sector. Such data is crucial in advocating for greater public surgery.

Aim:
To examine outcomes of a tertiary public bariatric surgery service.

Methods:
A 6 year audit of a prospective database years 2010-2016 of surgical outcomes at the Austin Hospital, Victoria.

Results:
The cohort consisted of 530 patients, 70% female, mean age 51 and BMI 49. 90% of patients had at least one significant comorbidity and 20% had 3 or more metabolic complications of their obesity. Diabetes was present in 39%. 609 procedures were performed in the audit period. Of these 45% of these were revisional and of these 86% were band related. External legacy patients comprised 20% of the revisional work load. Over the audit period there was a significant shift in procedure from gastric banding to resectional procedures (GB 73% 2010, 5% 2016).

Major (Accordion>=3) complication rate was 1.5% for primary and 13% for revisional procedures. Overall, 12% of patients have no record of follow up and 42% had not attended clinic within the last 12 months at the point of audit. Mean available follow up was 24 months (3-88 months).

Weight loss outcomes were comparable to most reported series. Overall %EWL at 2 years for primary surgery was 56% (Band 40%, Sleeve 52%, Bypass 75%). Comorbidity resolved or improved in 80% of diabetes, 63% hypertension and 60% sleep apnoea.

Conclusion:
Bariatric surgery in the public setting can be delivered safely and with efficacy. Patients are heavier, and more comorbid than in the private sector and revisional surgery burden is significant, particularly with gastric banding. Follow up is a major challenge and creative systems need to be developed in the setting of limited resources.

Goal of metabolic surgery

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Goal of metabolic surgery

Medical perspective

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Obesity and Type 2 Diabetes are chronic diseases that, to date, cannot be cured. The aims of chronic disease management are broad, fairly easily defined, and extend in these specific conditions well beyond weight and glycaemia. General goals include engaging the patient in taking an active ongoing approach in managing their disease; providing the resources for self-management support; and an integrated disease management team using a patient centred approach, founded on evidence based medicine and linked back to primary care.
Specific goals include improvement of physical and psychosocial function, and quality of life; prevention of end-organ damage and complications; and reduction of morbidity and mortality. Diabetes specific targets to minimise risk and optimise cardio-metabolic status (remission) would examine glycaemia, blood pressure, dyslipidaemia, weight loss and a reduction in pre-surgical medications requirements. Additional obesity specific goals would include normalisation of other obesity related complications and risks.

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Psychological perspective

Melissa Opozda
The bariatric patient population presents a unique and diverse set of psychological issues. Pre- and post-surgical patients often hold unrealistic beliefs about the likely effects of surgery and how their life will be changed by surgery and weight loss, and frequently report long-standing disordered eating patterns, mental health issues, and difficulties beginning or maintaining healthy behavioural change.

Psychological goals for bariatric surgery include assisting patients to develop realistic and helpful beliefs about the effects of surgery and the individual’s role in making lasting changes, and teaching helpful strategies to deal with difficulties related to self-image, relationships, social situations, making long-term behavioural change, and patterns of eating related to emotional regulation. Treatment to manage, reduce, and where possible, avoid the development of mental health conditions, eating disorders, and addictive behaviours may also be necessary.

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Dietitian perspective

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Dietitian perspective

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Nursing perspective

Andrea Schroeder1
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Not available at time of print

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Monitoring price promotions for all beverages sold within Australian supermarkets

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Price promotions (temporary price reductions or discounts) have been identified as a key driver of food and beverage choice and represent an important potential target for health policy. This is particularly true for sugar sweetened beverages (SSBs), which are currently in the political spotlight for their known association with excess weight gain, dental caries and a number of other chronic conditions. Nevertheless, there has been little systematic and regular evaluation of the type and extent of beverage price promotions in supermarkets world-wide, and none in Australia. We aimed to conduct a weekly (aligned with price promotion timeframes) systematic audit of all ready-to-drink beverage price promotions sold online at the two major Australian Supermarkets (Coles and Woolworths) over 52 weeks (October 2016 – October 2017; >600 beverage products per week). Information extracted for each beverage product included product name, volume, pack size, beverage category (from 20 different categories, e.g. carbonated sugar sweetened beverage, 100% juice), non-special retail price, special price and multi-buy information. A complete audit of all beverages sold (>2500 beverages with and without price promotion) was collected every quarter. Interim analysis of 26 weeks of data has identified that price promotions are ubiquitous across all beverages types (complete 52 weeks analysis due October). Price promotions were identified within each beverage category for >90% of the data collection period (with the exception of diet cordials, with price promotions 73% of the time). Average price reductions were greatest for carbonated SSBs (34.0% price reduction), followed by diet carbonated beverages (33.8%) and sports drinks (33.3%). Price promotions are extensively used for ready-to-drink beverages sold within Australian supermarkets and may undermine current policies to tax SSBs (commonly implemented with a 10-20% price increase). Restricting SSB price promotions may represent a possible strategy to manipulate their price and reduce population SSB purchase and consumption.
The positioning of sugary beverages as better for you via product labels in South Australian stores

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Background:
Sugary beverages make a notable contribution to free sugars in the diet and are attracting increased attention from health agencies interested in curbing obesity and associated non-communicable diseases. To combat increasing consumer concerns regarding the health effects of sugar, market research has predicted an increase in the sale of beverages portrayed as ‘better for you’. This has previously been demonstrated by other sections of the food industry, with product labelling being one way in which this message is communicated to consumers.

Methods:
The aim of this study was to examine how sugary beverages are being portrayed as better for you via product labels. During September to November 2016 we undertook an audit of beverage labels within 17 South Australian stores from leading supermarket chains. We conducted a content analysis of the labels of 945 sugar containing beverages for explicit and implicit features positioning these beverages as healthy or ‘better-for-you’.

Results:
The mean sugar content of beverages was high at 8.3g/100ml and the majority of sugary beverages (87.7%) displayed features that position them as better for you. This was most commonly achieved by associating the beverages with being natural (76.8%), reduced or natural energy/sugar content (48.4%) and through suggesting that they contribute to meeting the bodily needs for nutrition (38.5%) and health (15.1%). These features are more common among certain categories of beverages such as coconut waters, iced teas, sports drinks and juices.

Conclusions:
Despite existing regulations of nutrition and health claims on food and beverage products in Australia, beverages high in sugar use features on their labels that position them as healthy or better for you.

Harnessing the power of elite sport sponsorship to promote healthy eating by young adults

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5. Cancer Council New South Wales, Woolloomooloo, NSW, Australia

Background:
Unhealthy foods are promoted heavily, both in Australia and internationally, through food company sponsorship of elite sport, resulting in extensive exposure among young adults (YAs) who are avid sport spectators.

Aim:
To explore the effects of sponsorship of an elite sporting event by (A) non-food brands (control), (B) unhealthy food brands, (C) healthier food brands, or (D) an obesity prevention public health campaign on YA brand awareness, attitudes and image perceptions, and preference for food sponsors’ products.

Methods:
Between-subjects web-based experiment consisting of four sponsorship conditions featuring three product categories within each condition (e.g. breakfast cereal, take-away food, non-alcoholic beverage for conditions B & C). YAs aged 18-24 years (N=1,132) were recruited via a national online panel. Participants viewed promotional videos and news stories on an upcoming sport event (with sponsor content edited to reflect each condition), completed a distractor task, then answered questions assessing the response variables.

Results:
Compared to the control condition, unhealthy food sponsorship promoted higher awareness of and more favourable attitudes towards unhealthy food sponsor brands and greater transfer of perceptions of the sporting event to the unhealthy food sponsor brands. Exposure to healthier food sponsorship produced similar sponsorship effects for healthier food sponsor brands, as well as prompting a significant increase in the proportion of YAs showing a preference for healthier food sponsor products. Obesity prevention campaign sponsorship promoted higher awareness of that campaign but did not impact food attitudes or preference for unhealthy versus healthier foods.

Conclusion:
Findings suggest that restricting elite sport sponsorship to healthier food brands that meet set nutritional criteria could help promote healthy eating to YAs. However, as policy action in this area is unlikely in the short-term, sporting organisations should be encouraged to seek sponsorship from companies wishing to market healthier food brands through elite sport.
Ten years later: Outcomes of the WA healthy food and drink policy

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Schools are recognised as important sites for the implementation of nutrition interventions targeting children. Ten years ago, the Western Australian Government implemented the WA Healthy Food and Drink Policy in public schools. Initial evaluation results indicated that the Policy was well accepted by a range of stakeholders and was considered to have improved the healthiness of foods sold in school canteens. A follow-up study was conducted in late 2016 to assess the extent to which the Policy has been embedded in schools and the resulting outcomes in terms of the healthiness of foods provided on school premises. An online survey was administered to school principals, teachers, canteen managers, and P&C Presidents, with a resulting sample of 307 school representatives, half of whom were located in the metropolitan area and half in regional areas. There were very high levels of awareness of the Policy, and strong support for the Policy was expressed by respondents from all four stakeholder groups. Around two-thirds of respondents reported that their schools’ menus are now healthier and the foods provided are of higher quality compared to prior to the introduction of the Policy. Three-quarters reported that their schools are fully compliant with the Policy, and almost all canteen managers reported compliance with the traffic light food categorisation system. High levels of satisfaction were expressed for current support services provided by the WA School Canteen Association. Suggested areas of assistance included (i) additional information resources that can be sent home to parents to explain and engender support for the Policy, (ii) new curriculum resources to facilitate integration of the Policy with classroom activities, and (iii) additional ideas for fundraising strategies that do not involve unhealthy foods. The results will be used to develop enhanced services that can be delivered to schools to increase Policy compliance.

“It’s not a healthy meal if it’s got a potato”: Qualitative study to inform the development of LiveLighter TODAY

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An iterative user-focussed approach, was used to develop the LiveLighter Tailored Online Diet and ActivitY (LLTODY) intervention to improve diet, physical activity and weight loss behaviours in overweight adults. LiveLighter members, signed up via www.livelighter.com, were invited to participate in focus groups and/or telephone interviews to assist in the development of LLTODY randomised controlled trial intervention. Development of the intervention was based on the principles of the person-based approach to intervention development¹ and the Behavioural Intervention Technology Framework². Six focus groups and 6 interviews were conducted. The process was iterative with concepts from one group, developed and explored with the next, until saturation was achieved. The focus group guide explored weight management experience and the acceptability of specific intervention ideas. All sessions were digitally recorded and transcribed prior to thematic analysis. Participants included 27 females and 29 males with BMI’s from 24-42 kg/m² and 16 health professionals. Overall, there was confusion and misperceptions about weight loss behaviours relating to both nutrition and physical activity: “you can’t do 10,000 steps in 30 minutes, I don’t get it”, “it’s not a healthy meal if it’s got a potato”. Both health professionals and overweight adults expressed weight loss beliefs that were not supported by scientific evidence. Engaging the target audience in the intervention development offered unique insights into current weight loss behaviours, attitudes and beliefs. The LiveLighter campaign “why” healthy weight is important message, successfully reached overweight adults. However, misinformation and confusion regarding “how” to achieve behaviour change, needs to be addressed through targeted interventions.


An audit of food and beverage advertising on the Sydney metropolitan train network: regulation and policy implications

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Introduction:
Increased marketing of energy-dense, nutrient-poor foods has been identified as a driver of the global obesity epidemic and a priority area for preventative efforts. Local and international research has focused on the unhealthiness of television advertising, with limited research into the growing outdoor advertising industry. This study aimed to determine the level of public exposure to unhealthy food and beverage advertising on the Sydney metropolitan train network.

Methods:
All 178 stations on the Sydney metropolitan train network were surveyed in summer and winter. A survey tool was developed to collect information on the product, brand, location and size of all advertisements on and immediately surrounding the train station. Food and beverage advertisements were coded by nutrition category (core, discretionary, miscellaneous) according to the Australian Guide to Healthy Eating. Chi-square, ANOVA and ANCOVA tests were conducted to test for differences in the amount of food advertising by season and area socioeconomic status (SES).

Results:
Of 6931 advertisements identified, 1915 (27.6%) were promoting a food or beverage. The majority of food advertisements were for unhealthy products (84.3% discretionary; 8.0% core and 7.6% miscellaneous). Snack foods and sugar-sweetened beverages were the most frequently advertised products, irrespective of season. Coca-Cola and PepsiCo were the largest advertisers on the network, contributing 10.9% and 6.5% of total advertisements respectively. There was no difference in the mean number of food advertisements by area SES, but the proportion of advertising for discretionary foods was highest in low SES areas (41.9%, p < 0.001).

Conclusions:
The results indicate that food and beverage advertisements across the Sydney metropolitan train network are overwhelmingly for unhealthy products, particularly in low SES areas. This study highlights the inadequacy of Australia’s voluntary self-regulatory system in protecting members of the public from exposure to unhealthy food advertising, and the need for regulatory action by government.

Communities identify key complex drivers for obesity aligned with the Foresight Map but focus more on elements amenable to change

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Introduction:
Systems thinking methods, such as systems mapping, have been used to gain insight into the interplay of multiple causes and identify potential points for intervention. The Foresight map provides such a picture from the point of view of internationally recognised research leaders in obesity. Recent efforts to map systems from the perspective of community stakeholders present an opportunity to examine how community-led systems maps compare to the Foresight map. This research measures the similarity between the Foresight obesity systems map, and a community developed map of the local drivers of obesity.

Methods:
A formal systems mapping process was conducted with 160 community members from Western Victoria to develop a systems map of the causes of childhood obesity within their region. Variables from the community-developed systems map were coded against the themes defined in the Foresight map to allow comparison of the size of themes and strength of their adjoining causal relationships. Key variables were identified in each map using network analysis techniques. These variables were compared to understand the similarity in influential variables in the systems as defined by the two groups.

Results:
Compared to the Foresight map, the community map focused more on social influences, such as social psychology (37% of variables) and built physical activity environment (19%) and less on physiological and biological factors (2%), which was the Foresight map’s largest domain (23%). Comparing the relationships between the clusters, both maps reflected a strong impact of built environments on an individual’s behaviour. Network analysis showed similar strength of media and available time within both maps.

Conclusion:
The identification of social and environmental drivers over physiological factors in the community map provides evidence of the community’s focus and enthusiasm on drivers they could influence when describing the causes of obesity.

Competing with big business: Effects of messages to promote alcohol and sugary drink control policy

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The impact of 8 weeks of supervised exercise training on body composition in participants with overweight/obesity and type 2 diabetes: A randomised controlled trial

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Background:
High-intensity interval aerobic training with high-intensity resistance training (HIIT+HR) is a form of training that may reduce the negative health consequences of obesity in those with type 2 diabetes mellitus (T2D). We aimed to compare the efficacy of 8 weeks of HIIT+HR with moderate-intensity continuous aerobic training with moderate-intensity resistance training (MICT+MR) and with control on body composition in patients with T2D.

Methods:
Twenty-seven adults (60±7 years) with overweight/obesity (BMI=31.5±68.9kg/m2) and T2D (HbA1c 63±13 mmol/mol [7.9±1.3%]) were randomised into 8 weeks of either HIIT+HR (n=9), MICT+MR (n=11), or control (n=7). HIIT+HR employed aerobic exercise at 85-95% of peak heart rate (HRpeak) for four minutes followed by high-intensity resistance training (Rate of Perceived Exertion (RPE) ≥17) involving eight exercises for 1 minute each, 3/7. MICT+MR involved 150 mins/week of aerobic exercise at 55-69% of HRpeak and 60 mins/week of moderate-intensity resistance training (RPE 11-13), 4/7. Control participants received usual care. Trunk fat mass (TFM), trunk fat percentage (TF%), total fat mass (FM), body fat percentage (BF%), and lean body mass (LBM) were measured using dual-energy X-ray absorptiometry (DEXA). ANCOVA was used to determine differences in change scores between groups using the baseline value as the covariate. Values are reported as means±SD.

Results:
A significant between-group difference was observed with HIIT+HR (mean change from baseline of 2.2±1.9%; p=0.003) and a trend towards significance was observed for MICT+MR (0.5±1.7%; p=0.068) compared to controls (-1.9±3.2%) for LBM. There were no significant between-group differences with the HIIT+HR, MICT+MR or control groups for change in TFM (0.1±9.2%, 0.0±10.2%, and 2.2±6.6%, respectively), TF% (-1.1±5.3%, -0.1±2.6%, and 2.3±5.6%), FM (-0.1±7.9%, -0.6±2.8%, and 1.9±7.4%), and BF% (-1.3±4.2%, -0.7±2.5%, and 2.5±3.9%).

Conclusion:
HIIT+HR significantly improves LBM in patients with T2D compared to controls; however, there were no between group differences for measures of body adiposity.

Trial Registration: ACTRN12615000475549.
I've done it once, I can do it again: a qualitative investigation into maintaining weight after fast weight loss - The TEMPO Diet Trial

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Aim:

Very low energy diets (VLEDs) effectively induce fast weight loss in people with obesity, but health professionals tend to use them only before bariatric surgery or as a last resort. Part of the rationale underpinning infrequent use may be that VLEDs do not teach lifestyle behaviour changes needed for long-term weight maintenance. However, little is known about the long-term lived experiences of people who have lost weight on a VLED. This study aimed to explore the behaviours and experiences of post-menopausal women who had followed a 16-week VLED as part of the TEMPO Diet Trial (ANZCTR12612000651886).

Method:

Qualitative in depth semi-structured interviews were conducted with 15 participants. Transcribed interviews were analysed thematically using an inductive approach.

Results:

All participants reported significant weight loss while on the VLED, and all had maintained all or part of that weight loss at interview, at 1 or 2 years after VLED commencement. All participants reported that maintaining weight post-VLED was harder than losing weight with the VLED. Being on the VLED was reported to confer three main advantages in weight loss and maintenance. Firstly, the dramatic change in eating patterns was effective in breaking weight gain-inducing habits, allowing the women to “reset” their thinking about food. Secondly, the significant weight loss instilled motivation to keep it off and showed it was achievable. Thirdly, those who had regained weight, while disappointed, felt confident they had the skills to lose it again, having ‘proved to themselves’ they could do it. All participants continued to use meal replacement products as part of their maintenance strategy and would recommend the VLED to others.

Conclusion:

VLEDs administered under clinical supervision can confer confidence and motivation to maintain weight loss. These findings show that VLEDs can be successfully leveraged to set up healthy weight maintenance behaviours long term.

Physical Function Outcomes in Women with Severe Obesity Undergoing Energy Restriction and Exercise Training

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Background:

The rates of morbidity and mortality are rising rapidly, and this increases the prevalence of physical disabilities during ageing. Weight loss will improve physical function. Exercise training added to diet for weight loss improves fitness for adults with overweight even when weight loss is modest, but evidence shows the exercise training response may be blunted in obesity. The purpose of this research was to determine whether a high volume of exercise training for women with clinically severe obesity leads to higher physical performance outcomes in the presence of an energy restricted diet.

Methods:

60 pre-menopausal women with clinically severe obesity were randomised to either energy restriction only or energy restriction plus 300 weekly minutes of exercise training (aerobic plus resistance training). Participants underwent testing at 0, 3, 6, and 12 months for VO2peak, muscular strength, and body composition.

Results:

Upper and lower body strength improved to a greater extent in the exercise training group compared to energy restriction only at all time points (p<0.05). Exercise training improved VO2peak more than Energy restriction at three (mean diff±SEM, 2.5ml.kg.min±0.9, p=0.006) and six months (3.1ml.kg.min±1.7, p=0.007), but not 12 months (mean diff±SEM, 2.3ml.kg.min±1.6, p=0.15). Exercise training facilitated fat mass loss at three months (mean diff±SEM, -5kg±2.5, p=0.047), six months (mean diff±SEM, -6.2kg±2.7, p=0.023), but not 12 months (mean diff±SEM, -3.9kg±2.8, p=0.19). There were no differences in lean mass loss at any timepoint.

Conclusion:

Exercise training improved physical performance and body composition at three and six months, but this is not maintained at 12 months. Interestingly, differences in strength continued at 12 months. This is important because strength is a critical factor in gait, activities of daily living, occupational demands and prevention of musculoskeletal injury. Our results suggest that resistance exercise may be an important method for enhancing physical function following intentional weight loss.
Time restricted feeding improves glucose intolerance in men at risk of type 2 diabetes

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Time restricted feeding (TRF) is an emerging tool that reduces body weight and improves glucose tolerance in mice. However, it is unclear if TRF is effective in humans, or if a phase delay will impact outcomes.

Males (N=15, age 55.6±11.3y, BMI 33.9±3.1kg/m², waist circumference 115±9.5cm) were recruited into the study. Participants were fitted with continuous glucose monitors (CGM) for a 1-week baseline monitoring period followed by 2 x 1 week TRF conditions, in a randomised cross over design with a 2 week washout between conditions. Participants were instructed to consume their normal diet between 0800-1800h in the TRF-early (TRFe) condition and between 1100-2100h in the TRF-delay (TRFd) condition. No other instructions on food intake were provided. Standardised meal tests (Ensure Plus, 700 Kcal [57% carbohydrate, 28% fat, 15% protein]) were performed on Day 0 and Day 7 at 0800 (TRF-e) or 1100h (TRFd) and glucose and insulin incremental areas under the curve (IAUC) were calculated by trapezoidal rule. Statistics were performed using linear mixed modelling.

Body weight decreased during each condition by 0.8-1.2% (P<0.001), with no difference between TRFe and TRFd. Glucose IAUC was reduced by TRF (TRFe -119±39, TRFd -128±24 mmol.min/L, P=0.014), with no difference between conditions. TRF did not alter insulin IAUC (TRFe -2.96±1.37, TRFd -2.53±2.50 mmol.hour/L, P=0.09). Average daytime glucose (0800-2000h) by CGM was not different from baseline in TRFe or TRFd. However, in the TRFe condition, average early morning glucose (0200-0800h, TRFe 6.1±0.5, baseline 6.4±0.5 mmol/L, P=0.018) and early daytime glucose (0800-1400h, TRFe 5.8±0.7, baseline 6.2±0.6 mmol/L, P=0.006) were significantly lower vs baseline.

Time restricted feeding initiated at breakfast, and after a short phase delay reduced body weight and improved glucose tolerance after 1-week. The magnitude of this improvement is greater than that seen after initiation of metformin therapy in a similar population (1).

1. References 1. Li CL et al. Effect of metformin on patients with impaired glucose tolerance. Diabetic Medicine, 16, 477-81

High intensity interval training: An effective real-world exercise alternative for adults with obesity?

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Background:

Regular moderate-intensity exercise provides many health benefits, but adherence is often poor. An alternative approach - high-intensity interval training (HIIT), has demonstrated similar or better effectiveness over the short-term in supervised laboratory settings. Whether overweight people are able to undertake HIIT in the real-world without supervision, especially over the long-term, is unknown. The aim of this study was to determine the long-term adherence and effectiveness of an unsupervised HIIT programme in overweight and obese adults.

Methods:

Within a weight loss intervention study, 250 overweight adults (BMI>27) opted to undertake either HIIT (n=104, 42%), or current guidelines of at least 30 minutes daily moderate-intensity exercise (n=146, 58%). Following a single training session, HIIT participants were advised to undertake HIIT sessions independently thrice weekly for 12 months.

Results:

Those who chose HIIT were not younger, leaner, fitter or more active than those choosing current recommendations at baseline. At 12 months, the choice to undertake HIIT as an alternative to standard exercise guidelines led to no significant differences in any health outcomes: differences (95% CI) were -0.44kg (-2.5kg, 1.6kg) for weight, -103cm3 (-256cm3, 49cm3) for visceral fat, 0.0 ml/kg/min (-1.3, 1.2ml/kg/min) for estimated VO2max and 12 counts per minute (-26, 49) for overall physical activity. However, HIIT participants did report significantly higher enjoyment of physical activity (2.5: 0.6, 4.3). Although adherence to HIIT protocols was poor, those who continued with HIIT to 12 months (23%) had significantly greater weight loss (-2.7kg: -5.2kg, -0.2kg) and reductions in visceral fat (-292cm3: -483cm3, -101cm3) than non-adherent participants.

Conclusion:

Many overweight individuals of all backgrounds will try HIIT as an alternative to current exercise recommendations. HIIT did not perform better than current guidelines in the real world, presumably due to considerable non-adherence. However, important reductions in weight and visceral fat are feasible with good adherence.
Multidisciplinary VLED Intervention in patients with type 2 diabetes and morbid obesity results in significant metabolic benefits, irrespective of sleep apnoea status

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Introduction:
Type 2 diabetes (T2DM) and obstructive sleep apnoea (OSA) are improved by weight-loss and may enter remission.1-7 The use of a very-low energy diet (VLED) rapidly improves glycaemic control, and can achieve remission in patients with short and long duration of diabetes.1,2 However, it has been suggested that obese patients with OSA may be refractory to the acute beneficial metabolic effects of a VLED.8

Method:
Obese participants with T2DM and either treated OSA on continuous positive airway pressure therapy (CPAP n=8) or without OSA (non-CPP n=8) underwent 12-weeks of VLED (450-880kcal/day). Metabolic parameters were assessed at baseline and 12-weeks. Sleep studies were performed in participants with positive screening scores, or known OSA.

Results:
Baseline characteristics of the two groups demonstrated equivalent glycaemic control (HbA1c 7.4%), but a higher BMI (53.9±3.1kg/m2 vs. 44.8±2.6kg/m2; p=0.008) and waist circumference (148.6±2.6cm vs. 131.0±4.1cm; p=0.001) in the group treated with CPAP. Undiagnosed moderate-severe OSA (Apnoeas Hypopnoea index: AHI≥15) was identified in 3/8 untreated participants. Similar improvement was observed in both CPAP and non-CPAP groups for weight-loss (-17.4±2.5kg vs. -15.4±2.6kg; p=0.3), waist circumference (-12.6±1.9cm vs. -13.3±2.0cm; p=0.4) and HbA1c (-1.5±0.4% vs. -1.4±0.5%; p=0.4) despite reduction in insulin doses (-35%). The AHI remained unchanged in the participants on CPAP (22.1 to 25.3 events/hour measured without CPAP; p=0.3) and the non-CPAP group (31.5 to 26.1 events/hour; p=0.53). The VLED was equally effective in patients with mild OSA (AHI<15; n=6) compared to moderate OSA (Apneoa Hypopnoea index: AHI≥15; n=7) in reducing body-weight (-18.5±2.6kg vs -17±2.2kg; p=0.3); waist circumference (-13.3±2.1cm vs -12.4±2.3cm; p=0.4) and HbA1c (-1.4±0.5% vs -1.6±0.4%; p=0.4).

Conclusion:
Weight-loss using a VLED is an effective means of improving glycaemic control and reducing insulin requirements in patients with T2DM. This metabolic benefit is seen in obese patients irrespective of severity of OSA or treatment with CPAP.


Changes to psychosocial health for women with obesity during energy restriction with and without exercise.

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Introduction:
Young women with obesity are more likely to experience poorer psychosocial health than males or adults with normal weight. Exercise and energy restriction independently, positively, influence quality of life (QOL) and depressive symptoms amongst obese populations. Less is known regarding the possible additive effects of exercise training when added to dietary weight loss.

Methods:
60 pre-menopausal women with clinically severe obesity were randomised to either energy restriction only (ER) or energy restriction plus 300 weekly minutes of exercise training (EXER; aerobic plus resistance training). Participants underwent testing at 0, 3, 6, and 12 months for weight, QOL (SF-36) and depressive symptoms (Beck Depression Inventory).

Results:
Both groups improved QOL physical component scores at three and six months but not 12. Mental component scores improved at all time points for EXER (p<0.05) but only at three months for ER (p=0.025). Depressive symptom scores were improved at three and six months in both groups. At 12 months, only the EXER group had maintained improvements for symptoms of depression when compared to baseline (p<0.000). Group x Time interactions did not reach significance for any test at any time.

Conclusion:
This study shows that the addition of exercise training to energy restriction did not improve QOL or depressive symptoms for women with obesity more than energy restriction alone. Assessment of the effects of intervention on depressive symptoms is likely limited due to a ceiling effect.

The effect of a cardiac rehabilitation exercise program on energy intake

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Introduction:
Exercise is important in the management of cardiovascular disease through its role in creating a negative energy balance that is conducive to weight loss. However exercise may lead to less than expected weight loss if compensation occurs through increased energy intake. On the contrary, exercise may also reduce energy intake through improved appetite regulation, which may be intensity-dependent. Our aim was to describe the change in energy intake resulting from a cardiac rehabilitation program involving high intensity interval training (HIIT) or moderate intensity continuous training (MICT).

Methods:
38 participants (30 male, 8 female) with coronary artery disease (mean age 65.8 ± 5.9 years and body mass index of 28.0 ± 4.2 kg/m2) were randomised to 4-weeks of either isocaloric HIIT or MICT, training 3 times per week. Estimated energy expenditure was ~1MJ per session (3MJ per week). Both groups received standard cardiac rehabilitation nutrition education. Telephone interviews were utilised to conduct 24-hour diet recalls on two days at baseline and 2 days after the 4-week training period. Manual and automated (ASA24) recall methods were employed.

Results:
A significant main effect of time was evident for daily energy intake (mean difference -656 ± 288kJ; 95% CI: -72 to -1240; p=0.029) when groups were combined. There was also a significant reduction in total carbohydrate (p=0.017) and fat intake (p=0.034) with time. There was no intervention effect between MICT and HIIT (p = 0.150). No effect on bodyweight was found for intervention (p=0.381) or time (mean difference 0.22 ± 0.21kg; 95% CI: -0.20 to 0.64; p = 0.304) when groups were combined.

Conclusion:
Our results suggest that low volume exercise training does not result in compensation through increased energy intake in patients undertaking a 4-week cardiac rehabilitation program. Additionally exercise intensity did not influence the change in energy intake.

Lipid droplet protein, perilipin-5, regulates hepatic lipid metabolism and glucose tolerance

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Obesity is associated with dysfunctions in lipid and glucose metabolism, which is linked to the development of insulin resistance and type 2 diabetes. The perilipin (PLIN) family of proteins localize to cellular lipid droplets and control lipid flux within cells by coordinating protein-protein interactions. PLIN5 is expressed in highly oxidative tissues and, in skeletal muscle, controls triglyceride lipolysis and β-oxidation of fatty acids, which in turn helps to maintain insulin sensitivity in this tissue.

The aim of this study was to investigate the role of PLIN5 in regulating hepatic lipid and glucose metabolism in lean and obese mice. To address this aim, we generated PLIN5 liver-specific knockout mice (Plin5LKO) by crossing Plin5 floxed mice with albumin-Cre mice. Initial in vitro studies were performed in cultured primary hepatocytes obtained from Plin5LKO mice and wild-type (WT) control mice. Plin5LKO hepatocytes exhibited remarkable remodeling of lipid metabolism with decreased free fatty acid
uptake and oxidation, as well as decreased triglyceride lipolysis and oxidation of intrahepatic triglyceride-derived fatty acids. Equally, de novo lipogenesis and triglyceride secretion was decreased in Plin5Δ/Δ compared with Wt hepatocytes. In vivo studies show that Plin5Δ/Δ mice fed a chow diet have similar body mass, body composition, whole-body substrate oxidation rate and blood lipid profiles. When Plin5Δ/Δ mice were fed a high fat diet, a mild increase in overall body mass, fat mass and liver weight was observed. Additionally, liver triglyceride content and liver damage (ALT) was considerably increased. Hyperinsulinemic-euglycemic clamp studies demonstrated decreased glucose infusion rate and an inability to suppress hepatic glucose production during insulin stimulation in Plin5Δ/Δ mice. Ongoing studies will be directed at understanding how PLIN5 deficiency causes hepatic insulin resistance.

Energy intake and body weight gain increases in young female rats exposed to 10% liquid sucrose and additional cafeteria diet.

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The current obesity epidemic appears to be linked to increasing availability of highly palatable, energy-dense, Western Style foods, with the relative contributions of Sugar-Sweetened Beverages (SSBs) remaining somewhat contentious. Animal studies permit investigation of the response to a variety of cafeteria foods in the absence and presence of 10% liquid sucrose, under controlled conditions. Here, we sought to determine effects on body weight and macronutrient preference over time, in female rats as most studies to date have focused on males. Moreover, as adolescent intake of discretionary foods is high, we commenced diet in the pre-pubertal window.

5 week-old female Sprague Dawley rats were provided ad libitum access to one of four diets: standard chow (chow), standard chow + 10% sucrose (chow+sucrose), cafeteria diet (caf), and cafeteria diet + 10% sucrose (caf+sucrose). All groups had access to potable water and chow. Rats on cafeteria diet received a selection of common cafeteria foods, including biscuits, cake, dim sims, pie and chips, which were changed daily to provide choice.

Both cafeteria groups consumed more energy relative to chow-fed groups. Daily energy intake ranged from 244kJ in chow rats to 806kJ in caf+sucrose rats (p<0.01) compared to 610kJ in caf. Over 12 weeks, caf+sucrose rats more than doubled their starting weight, compared to 30%, 49%, 81% increases in chow, chow+sucrose and caf groups, respectively. We observed significant shifts in relative intake of protein, fat and carbohydrate over time. 10% sucrose availability led to gradual reductions in proportional intake of fat and protein. Chow+sucrose rats consumed 52% of their energy as sucrose versus 12% in caf+sucrose rats (p<0.01).

Thus, female rats on a high choice cafeteria diet overconsumed palatable food, and the addition of liquid sucrose drove intake further. Currently, we are examining the effects of macronutrient profile on other metabolic outcomes.

Intermittent fasting reduces adiposity, adipose tissue inflammation and fibrosis in lean and diet-induced obese mice

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Background:
In humans and mice, obesity is associated with chronic low-grade inflammation and fibrosis in adipose tissue that is reduced by caloric restriction, but the effects of intermittent fasting (IF) are unclear.

Methods:
Ten-week old male C57BL/6J mice were fed a lard based high-fat (HFD; 43% fat) or chow (18% fat) diet for 8wks ad libitum (AL). Mice on each diet were then randomised to AL or IF for 8wks (n=8/group). Intermittent 24h fasts were initiated at Z11 f and consecutive days/week, with AL access on non-fast days. Body weight and energy intake were measured daily. Oral glucose tolerance (2g/kg body weight) was assessed prior to sacrifice. In gonadal fat, markers of inflammation (F4/80, Mac2, CD11c, Nos2, Arg1, Erg2, Ccl2 and Ccl3) and extracellular matrix (Col3a1, Col6a1, Mmp2, Mmp9 and Timp1) were examined by qPCR. Ucp1 mRNA and protein (by immunohistochemistry) in gonadal and inguinal fat were assessed.

Results:
Energy intake was similar between chow groups, but was 26% lower in HFD-IF than HFD-AL group. Final body weight, gonadal and inguinal fat mass was increased in AL vs. IF groups (P<0.05). Glucose tolerance was impaired in HFD-AL group, and improved by IF, with a greater improvement in chow-IF vs. HFD-IF (all P<0.05). Fasting insulin was increased by HFD-AL, and decreased in HFD-IF vs. HFD-AL only (all P<0.001). IF reduced Mac2, CD11c, Nos2, Arg1, Erg2, CCL2, Col6a1 and Timp1 expression, and increased MMP2/TIMP1 and MMP9/TIMP1 vs. AL (all P<0.05). IF increased Ucp1 gene expression in both gonadal and inguinal fat and Ucp1 immunostaining in inguinal fat (P<0.05).

Conclusions:
Intermittent fasting decreases energy intake, fat mass, and markers of adipose tissue inflammation and fibrosis, and improves glucose tolerance. IF may promote adipose tissue browning in lean and diet-induced obese mice.
Dietary iron chelation prevents obesity in mice

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Background:
Obesity is increasing in prevalence worldwide, and is associated with cardiovascular disease, diabetes and inflammation. Dietary modification and/or supplementation have been evaluated for obesity treatment. We hypothesized that: 1) iron chelators would activate adipocyte hypoxia-signalling, activating brown/beige fat, and decreasing weight; and 2) this would be ineffective in mice lacking hypoxia-inducible factor (HIF1a) in brown/beige fat.

Methods:
Mice with floxed HIF-1a alleles (FC) were crossed with UCP1-Cre mice to generate brown/beige-fat HIF1a-null (bHIF) mice. All mice were fed high-fat diet (HFD, 45% energy from fat) for 10 weeks, and then fed chow, HFD, or HFD+iron chelator (30 mg/kg/day) for 6 weeks (n=24/group).

Results:
FC and bHIF mice gained similar amounts of weight over the first 10 weeks (+7.8g vs. +7.7g, respectively, p=0.87). When switched to chow, FC and bHIF mice lost equivalent amounts of weight (p=0.78). In the mice that continued on HFD, bHIF mice tended to gain less weight than FC mice (+5.6g vs. +3.1g, p=0.13). Notably, in mice that were switched to HFD+iron chelator, bHIF mice lost less weight than FC mice (-1.8g vs. -3.6g, p=0.07). In FC mice, iron chelator caused increased expression of thermogenic genes (Ucp1, Prapc1a, Prdm16, Cidea) in adipose tissue. The inguinal fat mass of FC mice (containing beige adipocytes) was half that of bHIF mice (263mg vs. 493mg, respectively, p=0.039). There was no difference in the masses of other organs.

Conclusions:
Iron chelator treatment causes weight loss in mice, but the underlying mechanisms are unknown. Our data suggest that HIF1a in brown/beige adipose tissue is required for iron chelator-induced weight loss. Moreover, absence of HIF1a in brown/beige adipocytes may also mitigate HFD-induced weight gain. Low-iron diets and iron chelators may be effective for the treatment or prevention of obesity, and this effect is at least partly mediated by HIF1a in brown/beige adipocytes.

The Yo-Yo effect: The fat you want to loose is the fat your body wants to keep.

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Acute activation or neonatal ablation studies show AgRP neurons are important in the control of energy homeostasis. However, these studies lack physiological context due to the nature of artificial activation or ablation. How AgRP neurons respond to physiological changes in metabolic state is unknown. We reasoned mitochondrial mechanisms act as metabolic sensors in AgRP neurons based on their ability to process glucose and fatty acids. We deleted carnitine acetyltransferase (Crat), a mitochondrial matrix enzyme regulating glucose and fat metabolism, from AgRP neurons (KO).

We found no differences between genotypes in body weight or blood glucose development during a nine-day 60% calorie restriction (CR) protocol, yet body composition analysis before and after CR revealed that KO lost more body fat and spare lean mass.

KO mice show significant differences in feeding behaviour, BAT temperature, and locomotor activity compared to WT mice in response to chronic calorie shortfall. Promethion metabolic cage analysis under advanced CR conditions (day 6-9 of CR) revealed that KO mice have increased average energy expenditure during this period and lower respiratory quotient compared to WT littermates. The latter indicates that KO mice are preferentially utilizing lipids as an energy substrate, underlying the greater loss of fat mass.

In order to examine rebound weight gain, WT and KO mice were ad-libitum fed for 11 days, interestingly KO took longer to reach pre-CR body fat reserves and gained more body weight due to greater food intake, showing after chronic energy deficit, analogous to diet-restricted weight loss in humans, mice defend relative body fat content rather than total body weight.

These findings have implications for weight management programs and imply, Crat in AgRP neurons is required to assess and adapt to low caloric environments.

Restricted feeding restores circadian rhythmicity of hepatic metabolic markers and reduces weight gain in high fat diet-induced obese mice.

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Background:
Shift work is associated with an increased risk of obesity and metabolic syndrome [1]. Metabolic processes exhibit a circadian rhythm entrained by the light-dark cycle and food intake [2]. We aimed to investigate the effect of restricted feeding (RF) on circadian variation in liver metabolism (enzyme mRNA) and thus establish the potential benefits of RF in health and obesity.

**Methods:**

Male C57BL/6 mice (8wks old) housed in a 12h light-dark cycle were split into 2 groups (n=120/group) and fed with either a standard laboratory diet (SLD; 14%kJ from fat) or a high fat diet (HFD; 60%kJ from fat) for 12wks. After 4wk diet acclimatisation the mice were split into 3 groups/diet (n=40/group) and fed either ad libitum (AL) or only during the light phase (LP) or dark phase (DP) for the remaining 8wks. Mice were sacrificed at 3h intervals across a 24h period (n=5 mice/time-point/group) starting at 0600h. Weight gain, plasma glucose, C-peptide & triglycerides concentrations were measured along with liver mRNA levels for mRNA from liver glucose transporter 2 (Slc2a2), insulin receptor (Irf6), glycogen synthase (Gys2), acetyl-CoA carboxylase (Aco2) and carnitine palmitoyltransferase (Cpt1a).

**Results:**

HFD-AL mice gained more weight (P<0.001) and gonadal fat (P<0.001) than all other groups including the HFD-LP&DP mice. Plasma triglyceride levels were reduced in HFD-LP&DP mice compared to HFD-AL mice (P<0.001). Plasma C-peptide levels were higher in SLD-DP&LP mice compared to SLD-AL mice (P<0.01) and in HFD-DP mice compared to HFD-AL mice (P<0.01). Liver mRNA levels of Slc2a2, Irf6, Gys2, Aco2 and Cpt1a exhibited a circadian rhythm in SLD-AL mice with desynchrony occurring in HFD-AL conditions (P<0.05). RF (DP&LP) in HFD mice, re-established circadian rhythmicity (P<0.05) and LP-feeding reversed the circadian profile (P<0.01) in line with food intake.

**Conclusion:**

Restricted feeding prevents the disruption of circadian metabolic markers and is associated with reduced weight gain.


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**Cortical inputs to the lateral hypothalamus influence body weight and food choice**

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Food choices are influenced by both metabolic need and hedonic motivation. The lateral hypothalamus (LH) is uniquely positioned to receive information related to both internal metabolic status and external cues. How the LH balances homeostatic and hedonic inputs to coordinate feeding and motivated behaviour has not yet been fully elucidated. The cortical regions of the brain including the orbital frontal cortex (OFC) and the anterior cingulate cortex (ACC) are understood to be involved in decision-making processes surrounding food and food reward. Anatomical tracing studies demonstrate monosynaptic projections from the OFC and ACC to the LH. However, whether these circuits are functionally relevant to feeding and motivated behaviours has not yet been explored. In this study, a dual-viral transgenic approach was used to ablate OFC-LH and ACC-LH pathways in separate cohorts of C57BL/6 mice. Ablation of the OFC-LH pathway resulted in increased bodyweight on a chow diet (p=0.033). While ablation of the ACC-LH pathway resulted in increased bodyweight on a high fat diet (HFD) (p=0.013). A battery of behavioural tests were used to investigate a potential role for this circuit in anxiety, risk-reward processing and hedonic aspects of feeding. Mice with OFC-LH pathway ablation tended to consume more HFD than controls over three-days of ad lib access to both chow and HFD (p=0.049). Results so far suggest these cortical-LH pathways influence food choices and body weight.

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**Metabolic and reproductive abnormalities in mice with impaired skeletal-mTORC1 function mirror a dietary restriction phenotype**

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Dietary restriction (DR) improves whole-body metabolism, extends lifespan while reducing reproductive function. The mechanisms leading to these profound physiological changes remain to be elucidated, however, suppression of mammalian target of rapamycin complex 1 (mTORC1) is thought to play a critical role. The skeleton has recently emerged as a critical endocrine tissue that regulates glucose and energy metabolism and male reproductive function, via release of the bone-specific hormone osteocalcin (OCN), suggesting that suppression of mTORC1 in the skeleton could play a crucial role in the physiological responses to DR.

To investigate the effects of suppressing skeletal-mTORC1 function on metabolism and male fertility, we generated mice in which raptor, an essential component of mTORC1, is deleted in osteoblasts (Raptor−/−). Raptor−/− mice are significantly smaller than controls and have increased bone marrow adipose tissue (MAT), and low bone mass that is associated with reduced serum OCN levels. Compared to controls, serum adiponectin levels are significantly elevated in Raptor−/− animals,

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while leptin levels are reduced. Serum triglyceride levels are also significantly reduced in Raptor\textsuperscript{OB}\/- mice, while free fatty acid levels are elevated. Importantly, despite being hypoinsulimic, Raptor\textsuperscript{OB}\/- mice have significantly lower fasting glucose levels, suggestive of insulin hypersensitivity. Consistent with this, insulin and glucose tolerance tests revealed that Raptor\textsuperscript{OB}\/- mice have enhanced glucose tolerance, insulin sensitivity and insulin secretion. Furthermore, the reproductive function of Raptor\textsuperscript{OB}\/- mice is significantly impaired as evidenced by reduced circulating testosterone levels and sperm counts. Our results demonstrate that physiological changes associated with DR (elevated MAT and circulating adiponectin levels, reduced leptin and triglyceride levels, improved glucose metabolism and impaired male reproductive function) are mirrored in Raptor\textsuperscript{OB}\/- mice, suggesting that skeletal-mTORC1 signalling is critical in the cellular responses to DR and highlights the essential role of skeleton in monitoring global nutritional status.

Psychological perspective
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Psychological perspective

Dietitians Perspective
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International Bariatric guidelines recommend an integrated team approach in caring for the bariatric surgical patient. The dietitian has a significant role within the team in making a decision for progression to surgery. Based on current evidence, bariatric surgery is the most effective intervention for severe obesity, producing substantial and durable weight loss and optimal health outcomes. The exclusion criteria for surgery are to serve to protect patients from exposure to risks that outweigh the potential benefits. A consequence of bariatric surgery is the structural alterations to the gastrointestinal system resulting in changes in nutrient ingestion, digestion and absorption. Potential candidates need to understand the dietary changes necessary to prevent complications. Dietitians are in a unique position to identify patients’ current lifestyle, diet adequacy, accessibility to appropriate food sources and practical aspects of meal preparation as well as their social and support networks. They can also identify the barriers for optimal outcome. Decision-making algorithm for bariatric surgery should be one to optimise their outcome and prevent any complications. In this contribution the practical aspects from dietitian’s perspective and reasons for denying or delaying bariatric surgery for patients will be covered.

Nursing perspective
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How to make a gold standard sleeve?
Michael France
How to make a gold standard sleeve?

How to fashion a single loop gastric bypass (fools gold)
Nicholas Williams
1. Calvary Health Care Riverina, Kooringal, NSW, Australia
How to fashion a single loop gastric bypass (fools gold)

ESG - new gold
Adrian Sartoretto
1. GBA, Double Bay, NSW, Australia
ESG - new gold

Roux Y gastric bypass - gold standard
Kelvin Higa
1. Fresno Heart & Surgical Hospital, Fresno, CA, United States

Many procedures such as the VBG and AGB have come and nearly disappeared claiming to be superior to the gastric bypass. Even though the sleeve gastrectomy is the most popular procedure worldwide, concerns regarding GERD and Barrett’s esophagus are emerging. Yet the gastric bypass continues to be the operation that all other are compared, not because it is the best, but because it has stood the test of time and other procedures have not endured long enough to demonstrate the favorable outcomes demonstrated in the Swedish Obesity Study or the Utah experience.

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Is quantity or quality of sleep more important for BMI? Longitudinal analyses using actigraphy
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SSRI antidepressant use potentiates weight gain in the context of unhealthy lifestyles: Results from a four-year Australian follow-up study
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Objective:
To examine the association between antidepressant use and weight gain, as well as the interaction with lifestyle factors.

Design:
Longitudinal study

Setting and participants:
We used data from 2334 adults from two stages (4.4 years apart) of the North West Adelaide Health Study, including validated diet and lifestyle questionnaires, measured body weight, and linked pharmaceutical data.

Main outcome measures:
Body weight change

Results:
188 (8.1%) participants had a mean annual number of 1-2 antidepressant prescriptions, and 212 (9.1%) had over 2 prescriptions. The mean annual weight gain was 0.12, 0.18 and 0.28 kg in non-users, low (1-2 prescriptions/year) and high (>2 prescriptions/year) antidepressant users, respectively. In multivariable regression models, antidepressant use was positively associated with weight gain: high antidepressant users gained an extra 0.22 (95%CI 0.00-0.44) kg per year. This association was mainly due to selective serotonin reuptake inhibitor (SSRI) use. High SSRI users gained 0.48 (95%CI 0.20-0.76) kg more than non-users. There was no association between tricyclics or other antidepressant use and weight gain. The association between SSRI use and weight gain was mainly seen among those with high intake of Western diet, sedentary activity, and smoking.

Conclusions:
Exposure to SSRIs potentiates weight gain, exceeding what occurs in the context of Western diet, sedentarism, and smoking without antidepressant exposure.

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The ‘legacy effect’ of parental influences on childhood health behaviours: a mixed methods study exploring predictors of divergent BMI trajectories from childhood into mid-adulthood
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Introduction:
Healthy weight adults who were overweight children have nearly identical cardiometabolic profiles to those who were healthy weight children, but few overweight children deviate from an obese trajectory. Understanding why some diverge could provide novel insights for public health interventions targeting childhood overweight/obesity ‘resolution’.
Methods:
Data were from a qualitative sub-study (2016; 38-46 years) of participants involved in the first (2004-6), second (2009-11) and third (2014-16) follow-ups of 8,498 children (7-15 years) from the 1985 Australian Schools Health and Fitness Survey. Using body mass index (BMI) z-scores, trajectory-based group modelling identified five trajectories: stable/low, stable/normal, high/decreasing, normal/increasing and high/increasing. Semi-structured interviews were conducted with six to twelve participants from each trajectory (n=50; 60% women) and thematically analysed exploring individual, social and environmental influences on weight, eating and physical activity since childhood.

Major findings:
The legacy of parental influences during childhood on lifestyle behaviours in adulthood was a strong theme discussed by the stable and high/decreasing groups (e.g. “mum did a great job setting me up”), persisting despite phases of unhealthy behaviours. In contrast, the legacy effect was weaker in the normal/increasing and high/increasing BMI groups (e.g. parents had ‘a little bit’ of influence). Some participants in the stable and decreasing groups suggested that their childhood or parents’ lifestyle was not healthy, prompting them to adopt a healthier lifestyle (e.g. “I didn’t smoke and I don’t drink really, and my mum did all those things and never did anything physical”).

Concluding statement:
This novel mixed-methods study is the first to link a lasting impact of parents’ lifestyle behaviours to divergent BMI trajectories from childhood to adulthood. This work deepens understandings of the long-term influence of childhood experiences on adult health, and provides direction for further quantitative exploration of divergent BMI trajectories.

Obesity prevention in Australia: where to from here? Insights from epidemiological modelling

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Background:
Over the last 3 decades, age-standardised BMI and prevalence of obesity in adults has increased in all developed countries. Worldwide, there has been an increase in prevention efforts in children, yet the major health and economic consequences of obesity occur in later life. Life course epidemiological modelling can provide insights into obesity progression and can guide priorities for targeted interventions in the future.

Methods:
We used a validated micro-simulation model of obesity progression in Australia to investigate future scenarios of the impact of targeted prevention of obesity in children/adolescents, young and older adults. The modelling takes into account BMI at transition to adulthood, age-specific adult BMI growth, informed by national data, and mortality associated with weight status. Using an input population representing around 17m adults from the 2014/15 National Health Survey, we simulated the number of healthy, overweight and obese adults between 2015 until 2040. We then investigated three scenarios: reducing mean BMI at transition to adulthood to 1995 levels (the assumed result of child/adolescent obesity prevention); and reducing weight gain of young and older adults, modeled independently using the lower 95% confidence bounds of observed age-based group modelling identified five trajectories: stable/low, stable/normal, high/decreasing, normal/increasing and high/increasing.

Results:
Prevention strategies differed in their short and long term effects. Reducing BMI at transition to adulthood had a delayed impact on adult obesity, whilst targeting adult weight gain had much earlier impact. The greatest reduction in obesity was achieved by reducing weight gain in young adults. Compared with reducing weight gain in older adults, this resulted in a two-fold reduction in the number of adults with obesity, by 2040.

Conclusion:
Obesity prevention efforts should occur throughout the life course. Our modelling suggests that young adults should be the focus of much more preventive efforts than is currently the case in Australia.

Association of childhood obesity with female infertility in adulthood: A 25-year follow up

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Background:
Adult obesity is associated with female infertility but few studies have examined the association with childhood obesity and the evidence is inconsistent.
Aims:
To evaluate whether childhood obesity is associated with infertility in women’s later life.

Methods:
The study consisted of 1,754 girls aged 7-15 years who participated in the 1985 Australian Schools Health and Fitness Survey and completed reproductive questionnaires at follow-up in 2004-2006 or 2009-2011 or both. Baseline measures of body composition included height, weight, waist and hip circumferences. Overweight and obesity in childhood were defined according to age and sex-specific international standard definitions for body mass index (BMI). Infertility was defined as having difficulty conceiving (had ever tried for ≥12 months to become pregnant without succeeding) or having ever seen a doctor because of trouble becoming pregnant. Covariates were childhood age, parental education and follow-up length, both childhood and adulthood smoking, socioeconomic status, alcohol intake, adult education level, marital status and adult BMI. Log-binomial regression was used to estimate the association of childhood body composition with infertility.

Results:
In total 8.1% of girls were overweight and 1.0% were obese at baseline. 22.1% of women reported infertility at follow-up. After adjusting for confounders including adult BMI, compared with normal weight girls, those with obesity between ages 7 and 11 were more likely to report infertility (relative risks (RR): 2.92, 95% confidence interval (CI): 1.40-6.07), difficulty conceiving (RR: 3.64, 95% CI: 1.70-7.80) and having ever seen a doctor because of trouble becoming pregnant (RR: 3.81, 95% CI: 1.91-7.57). Being overweight or obese in early adolescence (12-15y) had no association with later infertility.

Conclusions:
Obesity in childhood before age 12 appears to increase the risk of female infertility in later life.

Individualised dietary advice achieves better early weight loss targets compared to general dietary advice: results from the Healthtrack study

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While greater weight loss is achieved from combined attention to diet, exercise and behavioural support, early success appears to predict better adherence to interventions and greater long term weight loss.1,2 The aim of this study was to report on the relative success of individualised dietary advice versus general advice on early weight loss achievements in a 12 month intervention.

In the HealthTrack trial, 377 mostly obese adults (BMI 32 (29-35) kg/m²) were randomised to one of three weight loss interventions: interdisciplinary care incorporating individualised dietary advice, with (n=102) or without (n=99) a healthy food sample (30g walnuts/day) or control (general dietary guidelines advice)(n=95), delivered at 0,1,2,3,6,9,12 months. The clinically relevant target for weight loss was 5%. After 3 months more than 3 times the number of participants had reached 5% weight loss in the intervention arms compared to the controls (22% and 22% vs 6%, P=0.04). The difference was lost at 12 months (P=0.091) but retention was greatest in the walnut supplemented group (n=72 vs 45 vs 61 controls), with about the same number of participants measuring a 5% weight loss as at 3 months (n=26) in this group. Individualised dietary advice achieved greater short term success but long term adherence remains a challenge for all. From our analysis, the impact of providing of a healthy food supplement exemplifies the potential benefits of introducing enhancements for longer term success.


Obesity in Australia: a birth cohort analysis

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Obesity is a major public health issue in Australia. A previous analysis, which included people born up until 1976–1980, indicated that the prevalence of obesity at any given age had increased with each more recently born cohort. This analysis aimed to use more recent data to compare obesity prevalence at any given age between different birth cohorts.

Using data from the 1995 National Nutrition Survey, 2007–08 National Health Survey, 2011–12 Australian Health Survey and 2014–15 National Health Survey, birth cohorts were constructed based on approximated year of birth of survey participants. Obesity prevalence (as classified by a BMI based on measured height and weight of equal to or more than 30) among each birth cohort at each survey was then calculated.

Obesity prevalence during early adulthood for those born in the mid-1990s was approximately double that for those born in the mid-1970s. Similar differences in obesity prevalence were seen at other given ages. The findings of this analysis indicate that obesity prevalence was substantially higher among more recently born birth cohorts, and these increasing trends are continuing at several given ages, including younger ages. Given obesity is a risk factor for several chronic diseases, the observed earlier onset of obesity could be followed by earlier onset of chronic disease among more recently born birth cohorts.
Social marketing campaigns – what's the point? A case study.

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Background:
Obesity is a complex issue and with multi-faceted. While education is an essential element, alone it is inadequate to counter the influence of the obesogenic environment. However, social marketing campaigns can also be useful in shifting public demand for policies that promote healthy choices. We present a case study where a public education campaign can change individual behaviour and increase community support for policy.

Methods:
LiveLighter is a hard-hitting, evidence-based social marketing campaign to address overweight, poor diets and sedentary behaviour. Strategies include mass media campaigns, training for health professionals, practical tools for individuals and advocacy initiatives. LiveLighter aims to change social norms by shifting individuals' behaviour, driving the community's desire for healthier environments and to influence policy makers in taking action. This goes beyond traditional social marketing campaigns, where the focus is predominantly on the individual. Over a 12 month period of LiveLighter activity within Victoria a number of broad outcome measures were analysed.

Results:
The 2015-2016 Victorian LiveLighter mass media campaign led to a population level reduction in sugary drink consumption, reflecting the key intent of the campaign. Other, less tangible measures of the campaign success included: 183 health professionals upskilled in weight management techniques though LiveLighter training, push back from the processed food industry, and new engagement with non-traditional stakeholders including: politicians and community groups, the media (478 pieces of unpaid media coverage), campaign supporters (77 organisations), and the public (813 emails).

Conclusion:
While public education is a critical element for reducing obesity rates a strategically planned dynamic social marketing campaign can also play a much larger role in changing the environment and increasing political interest and public dialogue around obesity and overweight leading to engagement in the role of public health policies to address obesity.

The Overlooked: Obesity is often undiagnosed in hospitalised patients and is associated with significantly greater health costs and comorbidities

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Introduction:
The World Obesity Foundation has recently joined a growing list of organisations declaring obesity as a disease. In spite of this, obesity and its severity are scarcely objectively documented in hospitalised patients. We sought to determine the performance in diagnosing obesity at our hospital, a major tertiary centre in Western Sydney, where obesity and overweight individuals constitute 50% of the population.

Method:
An intake database as part of the Diabetes Detection and Management Strategy collected data of all patients who were admitted to Blacktown and Mt Druitt hospitals during April 2016 to February 2017. Basic demographic and diagnostic coding (specifically for obesity and related conditions) were analysed to determine the prevalence, rate of diagnosis of obesity and its impact on health costs.

Results:
Of a total of 43,212 admissions, a mere 390 had an obesity diagnosis (0.90% of the cohort); the latter were mostly English-speaking (92%), slightly older (57 vs 51 yrs), had significantly greater number of comorbidities (median 14 vs 4, p<0.001) and a higher prevalence of type 2 diabetes (62 vs 20%, p <0.001). Compared with non-diagnosed obese inpatients, patients with an obesity diagnosis had a significantly higher length of stay in hospital (median 190 vs 25 days, p<0.001) and intensive care (1.86 + 5.68 vs 0.23 + 1.71 days, p<0.001), as well as health expenditure (national weighted activity unit, a measure of health service activity expressed as a unit; 2.04 vs 0.83 p<0.001). Information on the severity of obesity and the prevalence of obesity-related comorbidities is ongoing.

Conclusion:
Acknowledgement of obesity by clinical staff clearly needs attention, especially in a population where obesity is nearly endemic. Targeted resource allocation should promote identification and initiation of treatment in patients identified as obese, considering the higher economic burden and comorbidities attributed to this disease.
A prospective multi-center study of health outcomes and the device explant rate after 5 years of treatment with laparoscopic adjustable gastric banding: The Helping Evaluate Reduction in Obesity (HERO) study.

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Background:
Current safety data on the LAP-BAND® adjustable gastric banding system (LBS) is mixed, with early data and some current data indicating high rates of re-operations and explants. This study was designed in conjunction with the USFDA to evaluate the real-world safety and effectiveness of the LBS for 5 years following implantation.

Objective:
To explore whether the LBS explantation rate over the first 5 years was significantly lower than a historic rate criterion of 39.4%.

Methods:
This is a prospective, longitudinal, multicentre study conducted in U.S. and Canada on patients who decided to undergo implantation of LBS from 2009 to 2016. 652 patients with BMI > 40 kg/m² or BMI >35 kg/m² with one or more comorbid conditions were included. Duration of follow-up was 5 years. The primary outcome was percentage of subjects who had LBS explant over 5 years. Secondary outcomes include reoperation rate, clinical and biochemical measures and patient reported outcome measures over 5 years.

Results:
79.3% were female, with mean age of 44 years and mean BMI of 45.4 kg/m². Primary endpoint was met with explant rate of 8.74% (95% CI: 6.6–10.9%) at 5 years. The rates for completer only analysis and imputed missing data analysis were 12.81% (95% CI: 9.7–15.9%) and 12.85% (95% CI: 10.2–15.5%) respectively. All were significantly lower than the historic rate of 39.4% (p<0.001). Sixty two reoperations or surgical revisions were performed in 50 subjects (7.7%). Mean weight loss of 18.7% was maximally achieved by 2 years, and weight loss was maintained through to 5 years. All patient-reported outcomes and quality of life measures showed improvement following LBS treatment, maintained through to 5 years.

Conclusion:
The HERO study validates the long-term safety and effectiveness of LBS for the treatment of patients with obesity and its related conditions.

Metabolic improvements following treatment with a duodenal-jejunal bypass sleeve in patients with obesity and type 2 diabetes

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Background:
Bariatric surgery is the most effective obesity treatment, however, less invasive options have recently been developed. The endoscopically placed duodenal-jejunal bypass sleeve (DJBS) (Endobarrier®) has been demonstrated to facilitate weight loss, but little is known about its impact on metabolic parameters.

Aim:
To assess the impact of the DJBS on metabolic outcomes in 15 patients with obesity and type 2 diabetes.

Methods:
The DJBS was implanted and remained in situ for up to 48 weeks. Subjects (M:F, 4:11) received medical and dietetic follow-up throughout. Liver biochemistry was monitored monthly. Hepatic fibrosis and intrahepatic fat (indicated by the Controlled Attenuation Parameter (CAP)) were assessed by hepatic transient elastography at baseline, 6 and 12 months. Glycaemic control and lipid profile were monitored every 4 months. Blood pressure was assessed at clinical reviews.

Results:
Body weight (123.8 ± 17.5 kg vs. 103.2 ± 16.8 kg; (p<0.0001)) and waist, hip and neck circumference (p<0.001; n=11) were significantly reduced. Liver function tests significantly improved (median alanine transaminase baseline: 34 U/L (29–49) vs. 19 U/L (16–23); median aspartate transaminase baseline: 25 U/L (18 – 33) vs. 16 U/L (14 – 18); (p<0.0001)). Hepatic fibrosis was significantly reduced (11.0 ± 7.6 kPa vs. 6.2 ± 1.8 kPa (p<0.05)), likely due to a significant reduction in intrahepatic fat as indicated by a reduction in the CAP (347 ± 41 vs. 302 ± 47 decibels/m; p<0.001). In parallel, significant improvements in mean glucose levels were observed.
glycated haemoglobin and fasting glucose (p<0.05) and total cholesterol, triglycerides and very low density lipoprotein (p<0.01) were observed. There was no significant change in high density lipoprotein cholesterol or systolic or diastolic blood pressure.

Conclusion:
DJBS implantation resulted in significant improvements in hepatic and other metabolic indices over the intervention period. Long-term data is being collected in relation to metabolic parameters post-explant.

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Liraglutide use in patients who have regained weight after bariatric surgery: The first Australian experience
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Introduction:
Significant weight regain is estimated to occur in 15-20% of patients who have had bariatric surgery, with few therapies proven to assist with further weight loss.

Objective:
The aim of this study was to investigate the efficacy and tolerability of liraglutide as an adjunct to bariatric surgery in patients with weight regain.

Methods:
We performed a retrospective audit of patients who had a primary bariatric procedure performed and had regained >15% of initial weight loss post primary bariatric surgery. Patients were prescribed liraglutide (1.8-3.0 mg /day up to 28 weeks) between March to November, 2016. Patients were followed up after 1, 4 and 7 months of liraglutide treatment.

Results:
Data were available from 32 patients (25 females; mean age 43±11years, initial BMI= 49.6±19.3 kg/m²) who had undergone LSG (n=20), LAGB (n=11) and RYGB (n=1). Bariatric surgery induced a median weight loss of -33.0% (range -53.3 to -8.6%). Liraglutide commenced a median 1.1year after surgery (range 0.1-11.1 years) with significant %body weight loss after 1 (median=-2.7%, n=29), 4 (median=-5.3%, n=25) and 7 months (median=-7.2%, n=9) (all P<0.001). 50% of patients tolerated liraglutide, although 50% (16/32) of patients discontinued liraglutide due to side effects (n=8), insufficient weight loss (n=5), cost (n=7) and other (n=1).

Conclusion:
Liraglutide can be used effectively as an adjuvant to induce a further 5-10% weight loss in patients who have regained weight after bariatric surgery, and is an overall well-tolerated pharmacotherapy. Follow-up of patients on liraglutide treatment is ongoing.

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Association between severity and onset of childhood obesity with parental obesity, gestational diabetes and birthweight
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Introduction:
Parental obesity with maternal gestational diabetes and birthweight has been linked to childhood obesity although data on the association with the severity and age of onset of childhood obesity is lacking.

Methodology:
This is a retrospective study of children aged 6 to 16 years old, who attended the weight management clinic, from January 2009 to December 2012. Patients’ clinical and anthropometric data were collected. Parental overweight status, birthweight, gestational diabetes and age of onset of obesity were self reported during the clinic visit.

Results:
A total of 416 patients (71% males) attended the clinic during the study period. Severity of obesity was significantly positively associated with birthweight in males (p=0.028). Severity of obesity was significantly positively associated with age of onset of obesity in both males and females (p=0.008). Presence of maternal gestational diabetes was associated with higher BMI SDS in males. No significant association was noted between parental obesity and age or severity of obesity at presentation.

Conclusion:
Larger birthweight and presence of maternatal gestational diabetes has impact on the severity of obesity in males whereas the age of onset of obesity influence the severity of obesity in both males and females. Earlier screening for risk factors and presence of obesity will be important in obesity management.

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Does attendance at follow-up bariatric surgery affect outcomes?
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Background:
Loss to follow-up after bariatric surgery is common, and the outcomes of patients lost to follow-up are unknown. We assessed whether there were differences in weight loss between patients who had bariatric surgery and were lost to follow-up (no follow-up for ≥2 years since last clinic visit) compared to those who attended the clinic infrequently (≥2 years between appointments) or had regular follow up.

Methods:
A longitudinal follow-up study of participants with severe obesity (mean BMI±SD and range 53.3±11.2 and 35.0–89.2 kg/m2), aged 21-73 (mean 52.4±11.5) years, who underwent bariatric surgery as public patients from 2009-2017. Patients deemed lost to follow-up were contacted and a clinic visit was arranged for measurements. A generalised linear model including fixed and random effects was used to model the changes in weight, BMI and waist circumference over time.

Results:
Of the 134 patients in this study (44 males), 119 had sleeve gastrectomy, 9 gastric banding, 3 mini-gastric bypass and 3 roux-en-y-gastric-bypass. They achieved a mean weight loss±SE of 21.2±0.6 kg at 3 months (n=127), 34.5±1.3 kg at 12 months (n=104), 36.1±1.6 kg at 18 months (n=83), 34.2±1.8 kg at 2 years (n=86), 32.5±2.0 kg at 3 years (n=46), 28.7±2.3 kg at 4 years (n=33), and 26.8±2.6 kg at 5 years (n=23). There were no differences in mean weight, BMI or waist circumference between people who were lost to follow-up or who attended follow-up infrequently or regularly.

Conclusions:
Contrary to expectations, there were no differences in weight loss whether or not patients returned for follow-up after bariatric surgery. One interpretation is that follow-up is unnecessary for long-term weight maintenance post bariatric surgery, but it is also possible that patients who are achieving successful weight loss do not feel the need to return to the clinic for follow-up.

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Fibre intake is independently associated with increased circulating interleukin-22 in individuals with metabolic syndrome
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Introduction: Interleukin-22 (IL-22) has been recently reported to counteract gut barrier disruption, which is known to be associated with low-grade inflammation and thus aggravation of metabolic syndrome (MetS) severity. Dietary fibre intake has been shown to positively impact the gut environment; however, the different mechanisms of its beneficial effects on gut barrier integrity have yet to be elucidated. The aim of this study was to examine the independent association of fibre intake and circulating IL-22 in individuals with MetS.

Methods: 48 participants with MetS were included in this study. Bivariate analysis was used to explore associations between circulating IL-22, fibre intake, MetS factors, body composition, and cardiorespiratory fitness. Circulating IL-22 was measured following a 12-hr overnight fast, via ELISA test; whilst dietary fibre intake was assessed using a 3-day food diary and analysed via FoodWorks software. Hierarchical Multiple Regression (HMR) was used to test the independent association of fibre intake with circulating IL-22. Independent t-test was also used to compare circulating IL-22 levels between high- and low-fibre intake groups.

Results: Circulating IL-22 was positively associated with fibre intake (r=0.399, p<0.006), cardiorespiratory fitness (r=0.330, p<0.022), and waist-to-hip ratio (r=0.389, p<0.006); while it was negatively associated with HDL (r=-0.378, p<0.008) and smoking status (r=-0.360, p<0.012). These variables were included in the HMR model, which explained almost 40% of circulating IL-22 variability. Fibre intake significantly improved the prediction model by 6.6% (p<0.041). The high-fibre intake group (above median intake of 21.5g/day) had a significantly higher circulating IL-22 than the low-fibre intake group (320.2±460.8 vs 79.1±115.8 pg/ml, p<0.022).
Conclusions: Fibre intake is independently associated with increased circulating IL-22 in individuals with MetS. These results provide further evidence on the importance of high dietary fibre intake in patients with MetS.

Predictors of non-completion of an intensive lifestyle and medical service for severe obesity in a public hospital setting

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Background:
There is a growing evidence base supporting intensive lifestyle and medical treatment for severe obesity, although dropout rates reported in these studies are high. Our aim was to identify predictors of non-completion of an intensive multidisciplinary treatment for severe obesity, called the Metabolic Rehabilitation Programme (MRP), in a public hospital clinic.

Methods:
We extracted data from medical records for 219 eligible obese patients with a body mass index (BMI) of 35 or greater referred to the MRP from 2014 through 2015. Non-completion status (case definition) was coded for patients who started but failed to complete at least 12 months of the MRP. Baseline predictors tested: age, gender, BMI, waist circumference, blood pressure, obstructive sleep apnoea (OSA), current continuous positive airway pressure (CPAP) therapy, current depression/anxiety, diabetes status, and medications.

Results:
78/219 (35.6%) failed to complete at least 12 months of MRP. Significant between-group differences (non-completers vs completers) included: age (47.1 vs 54.5 years); residential distance from clinic (21.8 vs 17.1 km); type 2 diabetes (56.4% vs 69.3%); and OSA (42.9% vs. 56.7%); current CPAP (11.7% vs 28.4%). Using multivariable logistic regressions, the probability of non-completion was: inversely associated with age (p=0.001), residential distance (p=0.084), and OSA (p=0.051) in Model 1; and inversely associated with age (p=0.001), residential distance (p=0.064), and CPAP (p=0.004) in Model 2. Using receiver operating characteristics (ROC) and area under the curve, Model 2 performed slightly better than Model 1 (69.5% vs 66.4%).

Conclusions:
Younger patients with fewer complex care needs living further away from the clinic were more likely dropout of this intensive obesity service than their colleagues. Clinicians should be aware of these risk factors when managing patients with severe obesity, whereas policy makers may consider strategies for increasing access to specialist obesity clinics/services.

3-year efficacy and safety for liraglutide 3.0 mg in adults with obesity/overweight, prediabetes and baseline BMI <35 vs ≥35 kg/m² in the SCALE Obesity and Prediabetes, double-blind, placebo-controlled trial

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Background:
The 3-year SCALE Obesity and Prediabetes trial (NCT01272219) randomized 2254 adults with prediabetes (female 76%; mean: age 48 years; BMI 39kg/m²) to liraglutide 3.0mg or placebo (PBO) as adjunct to diet+exercise for 160 weeks (W).

Methods:
This post-hoc analysis compared liraglutide efficacy and safety for adults with prediabetes and BMI < vs ≥35kg/m² at baseline (BL). Liraglutide treatment effect across BMI subgroups was evaluated by statistical testing of interaction between treatment and BMI subgroup.

Results:
BL characteristics were similar between liraglutide and PBO BMI subgroups (< vs ≥35) except weight-related characteristics (weight, BMI, waist circumference) and dyslipidaemia history (commoner for liraglutide BMI <35).
At 160W, significantly greater mean and categorical weight losses (WLs) were seen with liraglutide vs PBO for BMI < and ≥35 (mean WL [%]: −6.4, −6.0 vs −1.7, −2.0; percentage achieved ≥5% WL: 51.1, 48.9 vs 19.7, 25.0; >10% WL: 25.7, 23.7 vs 8.9, 9.8; >15% WL: 8.1, 8.0 vs 2.5, 2.2) and greater improvements in glycaemic parameters and QoL endpoints; these treatment effects appeared to be independent of BL BMI (interaction p=0.05). While on treatment at 160W, more people with liraglutide vs PBO regressed to normoglycaemia, irrespective of BL BMI: 66.1, 65.8% vs 34.9, 36.9%.

AE rates, and serious/severe AEs were generally comparable across BMI subgroups. Gallbladder-related AE rates were similar for liraglutide < and ≥35 (24 events vs 32 events [24 events/100 years-observation], 69 [3.1] but higher than PBO (6 [1.3], 12 [1.2]). Rates of pancreatitis were low, similar between BMI < and ≥35 but higher with liraglutide vs PBO (2 [0.2], 8 [0.3] vs 1 [0.2], 1 [0.1]), as were breast neoplasms (2 [0.3], 8 [0.4] vs 0 for PBO).

Conclusions:
3 years’ treatment with liraglutide 3.0mg had similar effects on body weight, glycaemic control and safety in subjects with baseline BMI < and ≥35kg/m².

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**Attenuation of metabolic syndrome by 5-O-caffeoyl-quinic acid in diet-induced obese rats**

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Chlorogenic acid (5-O-caffeoyl-quinic acid; CGA) is an important constituent of coffee so consumed regularly in the human diet. CGA intake has been associated with decreased risk of cardiovascular disease and type 2 diabetes. This study investigated whether CGA improves cardiovascular, liver and metabolic responses in a diet-induced rat model of metabolic syndrome induced by a high-carbohydrate, high-fat diet. This diet causes central obesity, impaired glucose tolerance, dyslipidaemia, cardiovascular remodelling, non-alcoholic fatty liver disease and tissue inflammation.

Male Wistar rats (8-9 week old, 335 ± 5 g, n = 48) were divided into 4 groups and fed with either corn starch diet (16 weeks), corn starch diet with 180 mg/kg/day CGA in food for last 8 weeks, high-carbohydrate, high-fat diet (16 weeks) or high-carbohydrate, high-fat diet with 100 mg/kg/day CGA in food for last 8 weeks. Rats were evaluated for metabolic, cardiovascular and liver structure and function at the end of protocol. In high-carbohydrate, high-fat diet-fed rats, CGA reduced energy intake and food efficiency to reduce visceral fat (especially retroperitoneal fat pads) and abdominal circumference compared to their obese control rats. In these obese rats, CGA reversed the elevated systolic blood pressure and attenuated left ventricular diastolic stiffness while reducing collagen deposition and infiltration of inflammatory cells in the left ventricle. CGA also decreased inflammation and fat deposition in the liver, and plasma liver enzyme activities of obese rats. However, CGA did not change the plasma lipid profile.

These results suggest that the decreased risk following CGA consumption is related to the decreased inflammation associated with high-carbohydrate, high-fat diets.

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**Can IL-22 therapy make fatty liver, skinny again?**

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Non-Alcoholic Fatty Liver Disease (NAFLD), or steatosis, is characterised by fat accumulation in hepatocytes in the liver where accumulation exceeds 5% of the volume or weight, independent of excessive alcohol consumption. The most prevalent liver disease was found to be NAFLD which affects an estimated 5.5 million Australians, including 40% of all adults aged 50 years and above. Moreover, the health costs of treating liver disease in 2012 were estimated as $432 million. NAFLD is more common in the presence of diabetes, obesity, hypercholesterolemia and increased inflammation, and is more likely to progress to cirrhosis and liver failure. Unfortunately mechanism of metabolic syndrome-derived NAFLD is not well understood and no specific therapy exists.

We have previously shown that interleukin 22 (IL-22) is a natural regulator of insulin biosynthesis and secretion, protecting the β-cell from stress and controlling hyperglycaemia in mice. The IL-22 receptor (IL-22RA1) is very highly expressed on hepatocytes. Therefore, in the current study we tested the whether IL-22 targets hepatocytes and suppresses oxidative/ER stress to restore metabolic function in murine models of NAFLD.

In HFD induced NAFLD mice IL-22 (i) restore enzymatic activity of liver (ii) increased the activation of cholesterol regulatory signalling effectors in liver to efflux excess lipid from the liver, (iii) induced ∼5% of liver weight and body weight loss over the 4 weeks of treatment, (iv) protected hepatocyte from oxidative stress and (v) effectively restored glycaemic control within 10 days of commencement of treatment.

Together these results demonstrate that IL-22-based therapy preserves biological activity of liver, decreases liver fat accumulation and induces cholesterol regulatory signalling which draw liver specific effect of IL-22 and the evidence that targeting can be used to reduce IL-22 effects on other tissues such as gut and skin while maintaining protective metabolic effects.

Long-term metabolic consequences of parity in the mouse

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During pregnancy and lactation, the maternal body undergoes many changes in the regulation of appetite, body weight and glucose homeostasis to deal with the metabolic demands of the growing fetus and subsequent demands of providing milk for offspring. The aim of the current study was to investigate the consequences of one reproductive cycle of pregnancy and lactation on the long-term regulation of energy homeostasis. Mice that had gone through successful pregnancy and three weeks of lactation, or aged-matched controls, were weighed weekly until 8 weeks post weaning of their pups (reproductively experienced, RE). Mice were housed in Promethion Metabolic Phenotyping Cages (Sable Systems International), with or without access to voluntary running wheels, for the recording of metabolic and behavioural data. RE mice had significantly higher body weight than aged-matched control (CON) mice (25.09 ± 0.34 g vs 23.13 ± 0.43 g). While there was no significant difference in daily food intake, or the feeding response to exogenous leptin administration, RE mice were significantly less active than CON mice as measured by average daily xy beam breaks (33022 ± 1664 vs 49463 ± 6269) or average daily locomotion distance (146.9 ± 15.5 m vs 238.4 ± 28.6 m). Surprisingly, when exposed to a running wheel both groups had similar levels of daily running wheel activity (Control:8215 ± 580 m vs RE:6768 ± 705 m) yet daily locomotion (non-running wheel) distance was less in the RE mice compared to CON mice (102.2 ± 4.8 m vs 129.3 ± 10.2 m). Overall these data suggest that after weaning of their pups, RE mice maintain an increased body weight compared to aged-matched virgin mice, possibly due to lower activity levels, thus emphasizing that pregnancy and lactation have long term consequences on body weight regulation in mothers.

Development and characterisation of a human primary brown adipose tissue cell line.

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Brown adipose tissue (BAT) is a potential therapeutic target to manage obesity by increasing energy expenditure. Development of a robust human BAT cell culture model to study the mechanisms of differentiation and thermogenesis is an important step for future therapeutic development. Past attempts have involved primary culture models using tissue extracted from around the cervical spine region in individual patients. However the reproducibility of experiments conducted in primary lines derived from different individuals is poor. Immortalising and expanding individual clonally selected cells based on high UCP1 gene expression is a strategy which overcomes poor reproducibility, but in so doing becomes less representative of primary cells and does not reflect the heterogenous composition of human BAT which is a mix of both brown and beige adipocytes. To address these issues, we developed a primary human brown/beige adipose cell culture model using subacromioclavicular adipose tissue from individuals undergoing shoulder surgery. Fibroblastic pre-adipocytes were isolated from 1-3g of tissue from each patient, expanded in culture, then frozen for storage. Multiple aggregate cell lines were then produced via combining lines from 10-15 individuals. ‘Standard’, previously published, differentiation (DMEM containing 2% fetal calf serum, 1µM rosiglitazone or pioglitazone, 1µM insulin, 500µM isobutylmethylxanthine, 25µM dexamethasone) conditions were employed, then systematically modified to optimise adipogenesis and browning. Evidence of adipogenesis and browning were based on the presence of lipid loading (oil red-O staining), adrenergic responsiveness (lipolysis in response to the β-adrenergic agonist isoproterenol) and UCP-1 protein expression (via western blotting). We have developed a robust human BAT primary cell culture model providing a platform for execution of experimental protocols yielding highly reproducible data. This model has been optimised for the study of human physiological BAT function and its pharmacological manipulation, with a view to informing new anti-obesity strategies.

Hypoxia-inducible factor (HIF) regulatory function in diet-induced obesity and β-cell function

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Background: Obesity, insulin resistance, and type 2 diabetes are related metabolic disorders. Obese adipose tissue can become hypoxic because of the inability of vasculature to keep pace with tissue growth. During the early stages of obesity, relative hypoxia causes an increase in the protein levels of hypoxia-inducible factor 1α (HIF1α). HIF-1 is a transcription factor that mediates adaptive responses to hypoxia and ischaemia. As a transcription factor, HIF-1 regulates the expression of hundreds of genes, including those encoding thermogenic genes in brown / beige fat. Because brown and beige fat consume glucose and lipids to produce heat, we tested whether deletion of HIF1α from brown and beige fat affected glucose tolerance or insulin sensitivity.

Methods:
AMPK in ghrelin receptor-expressing ventromedial hypothalamic neurons controls body weight gain.

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Obesity is a leading health problem and its prevalence is increasing worldwide at an alarming rate. It is currently estimated that 1 in 10 people in the world are obese. Ghrelin is an orexigenic peptide hormone that drives an increase in food intake and body weight by acting on growth hormone secretagogue receptors (GHSRs), expressed in many regions of the brain. However, the exact sites and mechanisms of actions of the hormone remain unknown. The GHSR is highly expressed in the ventromedial hypothalamus (VMH), a crucial region involved in energy homeostasis. AMP-activated protein kinase (AMPK) is required to convey the ghrelin signal, such as in the arcuate nucleus to ultimately increase food intake, but the role of AMPK in GHSR-expressing VMH neurons is yet to be explored. We thus hypothesise that AMPK in GHSR-expressing neurons of the VMH contributes to the control food intake, energy expenditure, and regulates body weight gain. We knocked down AMPK activity in GHSR-expressing VMH neurons via stereotaxic injections of crere-associated viruses in the GHSR cre mouse line, rendering the AMPK α2 subunit inactive. Injections sites were verified using immunohistochemistry for mCherry expression in the VMH. Down-regulation of AMPK activity in GHSR VMH neurons resulted in an increase in body weight on a chow diet over 8 weeks compared to controls, but no significant change in food intake. Energy expenditure was analysed using calorimetry. AMPK knock down impaired glucose tolerance, while no differences were observed during an insulin tolerance test and a 2-Deoxy-D-Glucose challenge test. Our data thus suggests that AMPK in GHSR VMH neurons is important to regulate glucose and energy homeostasis. Future studies are required to test whether these neurons are important for regulating responses to fasting and ghrelin administration.

Metabolic processing of energy status is required for physiological AgRP function.

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Acute activation or neonatal ablation studies show AgRP neurons are important in the control of energy homeostasis. However, these studies lack physiological context due to the nature of artificial activation or ablation. How AgRP neurons respond to physiological changes in metabolic state is unknown. We reasoned mitochondrial mechanisms act as metabolic sensors in AgRP neurons based on their ability to process glucose and fatty acids. We deleted carnitine acetyltransferase (Crat), a mitochondrial matrix enzyme regulating glucose and fat metabolism, from AgRP neurons (KO).

Feeding behaviour was significantly impaired in KO mice and food intake was significantly lower after fasting/refeeding. KO mice exhibited lower liver glycogen, increased liver triglyceride accumulation and oxidation measured by turnover of radiolabeled oleate during fasting. The liver changes were associated with reduced sympathetic nervous system innervation as measured by norepinephrine turnover. Hepatic gene expression indicated KO mice had increased counter-regulatory mechanisms to maintain plasma glucose concentrations. In order to understand how crat deletion has affected metabolism-sensing properties in AgRP neurons, we measured protein abundances in isolated AgRP neurons using mass spectrometry. This revealed differences in metabolic and cellular communication pathways between WT versus KO AgRP neurons from fed and fasted mice.

These findings imply, Crat in AgRP neurons is required to sense negative energy balance in order to control feeding behaviour and liver function.

The Melanocortin-4 Receptor regulates the secretion of PYY and GLP-1 from human gut epithelia

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Transgenic mice with floxed HIF1a alleles (FC) were crossed with UCP1-Cre mice to generate brown/beige-fat HIF1a-null (bHIF) mice. To induce obesity mice were fed high fat diet (HFD, 45% energy from fat) for 18 weeks. Glucose (GTT) and insulin (ITT) tolerance tests were performed at 18 weeks.

Results:

On HFD, at 18 weeks, despite similar food intake (4-5g day time, 5-6g night time), bHIF knockout mice showed a trend to being lighter (mean weight gain= 3.07g KO versus 5.58g WT, p=0.01). However, glucose tolerance and insulin sensitivity demonstrated no significant differences between the groups (p>0.5).

Conclusions:

Deletion of HIF1a from brown/beige fat had no effect on glucose tolerance or insulin sensitivity on diet-induced obese mice.
Background:
The central melanocortin system is a key regulator of energy homeostasis. Loss-of-function mutations of the melanocortin-4 receptor (MC4R) represents one of the most common monogenic obesity disorders[1]. A recent rodent study showed that MC4R is expressed by enteroendocrine L cells in the gut and intraperitoneal administration of MC4R peptide agonists caused significant release of the anorectic peptides, PYY and GLP-1, in vivo[2]. However, it remains unclear if this pathway exists in human.

Method:
Immunochemistry was performed on human duodenal biopsies and colon sections to characterize the MC4R system in the gut epithelia. An ex vivo preparation of human mucosa for secretion assays was developed from endoscopic duodenal biopsies and surgically resected human ileum and sections. 15 minute static incubations of the preparations different MC4R agonists and antagonists were performed and the secretion supernatants were assayed for PYY and GLP-1 content.

Results:
Immunohistochemistry showed gut epithelial cells express proopiomelanocortin (POMC, precursor for endogenous MC4R ligands) and a small portion also expresses GLP-1. 15 minute incubation with the endogenous MC4R agonist, α-Melanocyte stimulating hormone (MSH), and its more potent analogue, [Nle4,D-Phe7]-α-MSH (NDP-α-MSH), significantly triggered PYY and GLP-1 secretion from ileal and colonic mucosae. The stimulatory effect of NDP-α-MSH was attenuated by the endogenous MC4R antagonist, Agouti-related peptide (AgRP).

Conclusion:
This is the first study to confirm human L cells express MC4R and it is also the first to report that cells in the human gut epithelia express POMC. We demonstrated activation of MC4R by α-MSH and NDP-α-MSH caused significant PYY and GLP-1 secretion and this effect was blocked by the MC4R antagonist, AgRP. Together, this work suggests a local enteric MC4R system may exist in the gut to complement the central actions of the hypothalamic MC4R system.

The issues of obesity and climate change are the outcomes of a carbon intensive and sedentary society as well as through the influence of vested interests in opposing positive change. In this presentation, climate action advocate and thought leader Fiona Armstrong will share the progress of the Climate and Health Alliance towards policy change at the nexus of climate change and health. Many policy changes to reduce greenhouse gas emissions to arrest global warming will also bring positive improvements in terms of tackling obesity and chronic illness. This presentation will cover the role of collaboration, stakeholder engagement and community empowerment in effecting social and policy change.

Disrupting academia: using science for social change in the era of fake news

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Disrupting Academia: Using science for social change in the era of fake news

Receptivity of the Australian community to sugary drink policy interventions: Results from a national survey

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Introduction:
Sugary drinks contribute excess added sugars to the diet which is associated with weight gain and obesity and has direct causal links to insulin resistance, Type II diabetes and tooth decay. National and international health agencies are calling for a range of educative and policy interventions to reduce population-level consumption of sugary drinks. Policy reform will face strong industry opposition therefore it is essential that there is community engagement and support.

Methods:
Support for various policy approaches to curb sugary drink consumption was examined using a national survey of adults aged 18 years and over administered via Computer Assisted Telephone Interviews. The survey was conducted between February and April 2017 and random digit dialling of landline and mobile phones was used to obtain a nationally representative sample of 3430.

Results:
Preliminary results indicate that there was majority support (i.e. somewhat or strongly in favour) for all 10 policy interventions that were presented, including having text warning labels about health risks on bottles of sugary drinks (88% in favour) and the Government taxing drinks that are high in added sugar (60% in favour). Policy support was consistently higher among those believing that daily sugary drink consumption leads to health consequences than those who did not (e.g., 89% vs 85% for health-based text warning label policy; 65% vs 47% for supporting tax policy). Support was also higher for each of the proposed policy interventions among those with lower sugary drink consumption levels (none and 1-6 times per week) than those consuming higher amounts (7 or more times per week).

Conclusion:
These findings indicate that the Australian community is receptive to various forms of policy intervention. Furthermore, levels of policy support may increase with improved community awareness of the health risks associated with excess sugary drink consumption.

Consumer responses to Australian nutrition labels on healthy and unhealthy foods

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The Daily Intake Guide (an industry-created nutrition label) and the Health Star Rating (a new label created by a joint committee of government, academic, food industry, public health and consumer representatives) are two nutrition labels currently appearing on foods in Australian supermarkets. Two studies were conducted looking at how these labels influence consumer perceptions of product healthiness and product choices.

Australian consumers, aged 10 to 90, were recruited from the general population from high, medium and low socioeconomic backgrounds. Across both studies, respondents were presented with fictional products that varied in healthiness and the type of front-of-pack label present. A range of food products was tested, including foods that are often consumed as snacks and meals.

In the first study, respondents (n = 2,058) rated the products on how healthy they perceived them to be. In the second study, a separate sample of respondents (n = 2,069) viewed products within choice sets and indicated which product they would be most likely to buy.

When the Daily Intake Guide was present on-pack, there was no difference in perceptions of healthiness or product choice according to actual healthiness, suggesting that respondents were less able to discriminate between healthy and unhealthy products with this label. In contrast, when the Health Star Rating was present, respondents’ perceptions of healthiness and their selection of products positively aligned with actual product healthiness. Importantly, the Health Star Rating helped consumers identify and avoid unhealthy products suggesting that food selection was based on healthiness and was not solely due to the presence of the label.

These studies, conducted across a large sample of consumers, provide converging evidence that the Health Star Rating is more effective than the Daily Intake Guide at helping consumers of all ages and socioeconomic groups to make healthier food choices.

Challenges of weight management during childhood and adolescence

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This presentation will cover difficulties in managing obesity in childhood which is not caused by hypothalamic, hormonal, monogenic or syndromic disorders.

Challenges in the management of childhood and adolescent obesity are common as in any other chronic medical condition. They include recognition and acceptance of the problem by child or adolescent, parents and health professionals; inconsistent and/or conflicting role models in households; limited appropriate health services and resources to deal with the multiple facets of this condition; and the lack of evidence for long term effective interventions.

Both parents are instrumental and both are required in establishing and promoting the maintenance of life-long behavioural lifestyle changes during growth and as the child matures mentally. Parenting also needs to adapt.

Adolescents are challenging patients as they experience substantial physical, physiological and behavioural changes that impact on weight management and their adherence to interventions. Additionally, newer medications that have been used in adults have not been evaluated in adolescents with severe obesity; and other invasive interventions such as bariatric surgical procedures have only been evaluated for short to medium term studies during adolescence. Whilst these studies report reasonable beneficial effects on weight loss there are also nutritional deficiencies of unknown long-term effects on general health and bone status.

The lack of effective transition programs for transfer to adult care also impacts on weight management success.

Weight management in women of reproductive age

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Up to 35-45% of 25-44 year old Australian women and 50% of pregnant women are overweight or obese which is associated with elevated risk of chronic diseases such as cardiovascular disease (CVD), type 2 diabetes mellitus (DM2) and poor mental health. Reproductive-aged women present the population group at highest obesity risk due to longitudinal weight gain. This is related to factors including poor dietary intake, family and time commitments, physical inactivity and psychological exacerbation of excess food consumption. There are key life stages in reproductive-aged women where it is crucial to intervene to improve lifestyle behaviours and weight management. These include pre-conception and pregnancy. Pregnancy and postpartum life stages are commonly associated with weight gain, post-partum weight retention, and weight gain in the early parenting years. Obesity pre and during pregnancy and excess gestational weight gain are also associated with adverse pregnancy (eg gestational diabetes, preeclampsia), postpartum (post-partum weight retention, increased DM2 and CVD risk) and offspring (increased obesity and cardiometabolic risk) outcomes. There are also specific health conditions in reproductive-aged women which can confer additional adverse consequences of obesity such as polycystic ovary syndrome (PCOS) which affects up to 18% of Australian women with obesity-related consequences including infertility, type 2 diabetes and poor psychological health.

Optimising weight management in reproductive-aged women is therefore a logical and critical public health strategy issue for reducing obesity-related morbidities. It is imperative to prevent the development of obesity at an early stage as possible to reduce the risk of obesity-associated disease in women and their children.
Reproductive complications of obesity in men

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Obesity has deleterious effects on sexual and reproductive function in men, that have until relatively recently garnered limited attention. A predominantly visceral accumulation of adipose tissue, with associated metabolic abnormalities, induces a “functional secondary hypogonadism” characterised by low serum total testosterone (T) and sex hormone binding globulin concentrations and gonadotrophins in the mid- or low normal range. Such low T may accelerate progression of impaired glucose metabolism to type 2 diabetes. T increases proportionally to weight loss, which is the appropriate management. Independent of testosterone men with obesity are also more likely to have erectile dysfunction and diminished sexual desire as well as abnormalities in the morphology and function of their sperm, high levels of reactive oxygen species (ROS) in seminal fluid, vulnerability of the sperm to oxidative damage and reduced pregnancy rates as compared to normal weight men. Epigenetic changes to sperm DNA and altered pattern of microRNA’s in sperm may result in the transmission of chronic disease risk to subsequent generations.

The extent to which these problems are attributable to obesity as such or associated comorbidities, dietary pattern, and other lifestyle behaviours, and/or environmental exposure, is unclear. Men who are socially disadvantaged (low income, unemployed, separated, victims of racial and ethnic disparity), located in rural and remote locations, and/or have limited functional health literacy have a higher risk of obesity associated comorbidities.

A novel home-based intervention for child and adolescent obesity: the 12 month outcomes of Whānau Pakari randomised controlled trial.

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Introduction:
Childhood obesity is a problem requiring innovative solutions. In New Zealand (NZ), Māori, Pacific people, and those living in most deprived households are over-represented in obesity statistics. We report 12-month post-treatment outcomes from ‘Whānau Pakari’, a multi-disciplinary child obesity intervention programme targeting high risk groups (predominantly Māori and those from deprivation in this region).

Methods:
This was an unblinded randomised controlled clinical trial. Participants (recruited January 2012-August 2014) were aged 5-16-years, resided in Taranaki, NZ, with a body mass index (BMI) ≥98th centile or BMI >91st centile with weight-related comorbidities. Participants were randomised by minimisation (using age and ethnicity) either to intense intervention (12 monthly multi-disciplinary programme with weekly multi-disciplinary group sessions) or a lower intensity control arm with 6-monthly home-based assessments. At ‘demedicalised’ home visits, participants underwent clinical assessments, with physical and psychological wellbeing evaluated. The primary outcome was change in BMI standard deviation score (SDS) 12-months from baseline.

Results:
203 children were randomised (47% Māori, 43% NZ European [NZE]), 53% female, 28% living in the most deprived quintile of households, mean age 10.7 years, mean BMI SDS 3.12 (range 1.52-5.34). There were no differences in primary or secondary outcomes between intense intervention and lower intensity control. Participants in both groups displayed a reduction in BMI SDS at 12 months from baseline (-0.12 control and -0.10 intervention). For those attending ≥70% of intense intervention sessions, change in BMI SDS was -0.22 compared with -0.04 for those attending <70% (p=0.04), with NZE more likely to attend (p<0.0001).

Conclusion:
In this home-based obesity programme, where almost half of those recruited were Māori, BMI SDS was reduced irrespective of intervention intensity. With high adherence to the intense intervention, substantially improved outcomes are seen. Future obesity programmes need to be accessible and appropriate for high-risk groups, and focus on ways to improve adherence.

Prevalence and predictors of early gestational weight gain associated with obesity risk in a diverse antenatal population

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Neural substrates of unhealthy food choice in obesity

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Obesity has been traditionally viewed as an energy regulation disorder, and research on its brain underpinnings has been focused on the hypothalamus. Nevertheless, increases in food availability and changes in lifestyle have made evident that extra-hypothalamic brain systems including frontal-striatal systems involved in motivated behavior, emotion and decision-making are needed to control weight. I will present evidence from brain imaging studies showing that striatal, insula and prefrontal cortical systems involved in reward processing, interoception (perception of bodily changes) and food choices are linked to obesity, and can hinder attempts to control weight.
Impact of obesogenic diets on social memory and behaviour, reward neurotransmission and gut microbiota in adolescent rats

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Across mammalian species, social interaction with peers is considered a rewarding experience. In rats, social behaviours during adolescence are of principal importance for the development of appropriate adult behaviours. Social behaviour in rats has been shown to be sensitive to environmental and neurochemical factors such as stress and monoamine signaling in the prefrontal cortex and hippocampus. Palatable food consumption activates the mesocorticolimbic reward pathway in the brain, and overconsumption of these foods is detrimental to aspects of learning and behaviour mediated by the hippocampus and prefrontal cortex. In these experiments we examined the impact of 2 h daily access to a high fat / high sugar (HFHS) diet on social behaviours in adolescent male rats. Social interaction behaviours with a novel control rat were reduced when HFHS consuming rats were withdrawn from the palatable diet, but not following access to the HFHS food. Rats exposed to the HFHS diets also showed impairments at a social memory task requiring them to discriminate between a novel and a familiar rat. However, HFHS rats showed similar object recognition memory and odour recognition memory to control chow fed animals suggesting other aspects of memory were not impaired. Analysis of gene expression in the prefrontal cortex and hippocampus by qPCR demonstrated reduced levels of monoamine oxidase A (MAO-A) and catechol-O-methyltransferase (COMT) mRNA in HFHS diet fed rats compared to controls. These genes are involved in the synthesis of monoamines including dopamine and serotonin, indicating that the HFHS diet had an impact on reward neurotransmission in these brain regions. Furthermore, we observed significant differences in gut microbiota composition between the diet groups, particularly with respect to decreased abundance of Bacteroidetes, which has been linked to obesity and mood disorders in humans.

Characterising the metabolic phenotype in adolescent inhalant abuse: long-term changes to energy balance independent of food intake

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Background:
Abuse of products containing toluene (e.g. glue sniffing) primarily occurs during adolescence and has been associated with symptoms such as appetite suppression and impaired weight gain. However, the metabolic phenotype arising from adolescent inhalant abuse has never been fully characterised, and the persistence of this phenotype during abstinence remains unknown. Adolescent male Wistar rats (PND 27) were exposed to inhaled toluene (10,000ppm) (n=42) or air (n=48) for 1 hour/day, 3 days/week for 4 weeks, followed by 4 weeks abstinence. 20 air rats and 20 toluene rats were withdrawn from the palatable diet, but not following access to the HFHS food. Appetite signalling hormones were measured, after both the last exposure and abstinence, and during an insulin tolerance test. Energy expenditure was measured using metabolic cages and adipose tissue assays.

Results:
Toluene-exposure suppressed appetite by up to 26% (p<0.001). Reduced weight gain (p<0.001) and growth (p=0.001) were observed in both the toluene and pair-fed groups. Compared to the pair-fed group, toluene rats’ weight or growth did not normalise in abstinence (p=0.001), despite normalisation of food consumption. Toluene-exposure increased metabolic rate (p=0.035), energy expenditure (p=0.028), thermogenesis in adipose tissue (p=0.005), and altered substrate utilisation (p=0.024). After 4 weeks’ exposure, toluene rats had decreased fasting blood glucose (p=0.022) and decreased fasting insulin (p=0.005) compared to both air and pair-fed groups, and increased insulin sensitivity (p=0.003).

Conclusions:
Toluene-exposure results in a hypermetabolic phenotype, which persists during abstinence. Our results suggest a long-term alteration of growth set-points, independent of food intake, which includes altered glucose regulation. Whilst the underlying mechanism of this phenotype is the focus of future studies, our findings demonstrate that the metabolic consequences of inhalant abuse may affect the health of individuals beyond the time of active substance abuse.

Reward circuit activation prevents and rescues activity-based anorexia (ABA) in the rat

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Patients suffering anorexia nervosa (AN) become anhedonic; unable or unwilling to derive normal pleasures or rewards, particularly regarding food intake. Neuroimaging studies of AN patients reveal a neurobiological contribution to the disorder. The rodent Activity-Based Anorexia (ABA) model recapitulates human AN symptomology, including anhedonia. We will use this model to highlight the importance of reward pathways in maintenance of body weight within the context of AN. We hypothesize that increasing neuronal activity in reward circuits, predicted to underpin anhedonia in ABA, will prevent and even rescue ABA-associated weight loss.

Female rats (n=44; 6 weeks old) underwent bilateral stereotaxic injections of canine adenovirus-2-Cre (CAV2-Cre) into the nucleus accumbens (NAc) and activating DREADDs (AAV-hSyn-DIO-hM3D(Gq)-mCherry) into the ventral tegmental area (VTA). DREADDs reorient in the presence of retrogradely-transported Cre and intraperitoneal clozapine-n-oxide (CNO) administration causes mCherry-labelled cells to depolarise with temporal and anatomical specificity. ABA involves free access to running wheels and temporal food restriction (90 min/day), with daily intraperitoneal injections of CNO or saline (control) at the onset of food availability. For “prevention” experiments, CNO treatment commenced with the initiation of ABA, whereas for “rescue” experiments, CNO treatment was initiated following at least 15% baseline body weight loss.

CNO activation of DREADD-expressing VTA neurons was confirmed by colocalization of mCherry with elevated levels of Fos protein, a marker of neuronal activity. During prevention, CNO-mediated activation of this pathway increased food intake (t(22)=3.43, p=0.002) with a profound effect on survival (χ²(1)=9.95, p=0.002). Additionally, CNO-mediated activation resulted in increased food anticipatory activity (FAA) which was positively correlated with subsequent food intake (r=64, F=41, p=0.0001). Importantly during rescue, CNO-mediated excitation of this pathway increased survival (χ²(1)=3.97, p=0.046) with a small increase in food intake. These data highlight the importance of CNS reward pathways in feeding behaviour and sign-post possible therapeutic strategies for AN.

Prevalence of Metabolic Syndrome and its Individual Features Across Different (Normal, Overweight, Pre Obese and Obese) Body Mass Index (BMI) Categories in a Tertiary Hospital: A Cross Sectional Study

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Objective:
This study aims to determine the prevalence of metabolic syndrome and its individual components across different BMI categories among patients seen at Wellness Center and Obesity and Weight Management Center, St. Luke’s Medical Center Quezon City.

Methodology:
This was a 3-year retrospective study of 1367 adult patients seen at the institution from 2013 to 2016. The patients were divided according to BMI categories and presence of metabolic syndrome was determined based on the set criteria for the disease.

Results:
Overall prevalence of metabolic syndrome is 51.0%. Its prevalence across the different BMI categories are as follows: 29.6% with Normal BMI, 38.9% in overweight, 56.9% in Pre Obese and 62.4% in obese subgroup. Presence of central obesity using the Asian cut off has the highest prevalence among patients with metabolic syndrome across all categories. In the normal BMI hypertension and elevated blood glucose has the highest prevalence with central obesity being the least common but still with 7.3% of individuals meeting the criteria for central obesity.

Conclusion:
There is high prevalence of Metabolic syndrome even in patients with low BMI and its diagnosis and screening for its individual components should not only be confined to individuals with higher BMI.

Secular trend and longitudinal associations between obesity and sleep habits in Hong Kong Chinese school children - a prospective follow-up

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Background:
The secular trend and longitudinal relationship between obesity and sleep in adolescents are under-explored. We aimed to examine the secular trend and longitudinal association between obesity and sleep habits in Hong Kong Chinese school children.

Methods:
Based on a cohort of Hong Kong Chinese school children surveyed in 2007-2008, who were all healthy volunteers with well-documented anthropometric parameters and sleep patterns using validated questionnaires, we called back 516 participants to have follow-up examinations in 2013-2015. Obesity was defined as body mass index (BMI) ≥95th percentile for aged <18 years or ≥25 kg/m² for those aged ≥18 years. Central obesity was defined as 90th percentile of waist circumference (WC) or adult cut-off if lower.

Results:
Mean age of this prospective cohort was 12.8 years (standard deviation, SD 3.6) at baseline and 19.0 years (SD 3.6) at follow-up. 37.6% were male. BMI at baseline and follow-up were 18.5 (SD 3.1) and 20.9 (SD 3.4) kg/m². The respective figures for WC were 63.7 (SD 8.9) and 69.8 (SD 9.7) cm. The rate of obesity was 8.3% (95% confidence interval CI=6.1-11.1) at baseline and 11.3% (CI=8.7-14.4), p=0.034. By contrast, there was a significant decline in the frequency of central obesity [16.9% (CI=13.7-20.4) vs 13.5% (CI=10.6-16.8%), p=0.034]. Compared to sleep habits at baseline, more participants reported short sleep duration (<7 hours per day during weekday) [15.3% (CI=12.3-18.8) vs 20.5% (CI=17.1-24.2), p=0.033] and bedtime after midnight [18.2% (CI=13.1-19.7) vs 60.5% (CI=55.2-64.8), p<0.001] during follow-up.

Conclusion:
There was an increasing rate of general obesity but a decreasing trend of central obesity in our youth population. There were significantly more participants reported short sleep duration and late bedtime during follow-up. No significant association between obesity and sleep habits were found. Long-term study would be required to address the health consequences of unhealthy sleeping habits.

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Oral processing behaviours are stable over time and predict prospective increases in children’s adiposity: Results from the GUSTO Cohort.

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Faster eating rates have been associated with increased energy intake at a single meal, but the development and stability of this potentially problematic behaviour and its link to body composition remain unclear. Our study assessed the consistency of faster eating style over time and related this to changes in adiposity in children (n= 198) from the Growing Up in Singapore Towards Healthy Outcomes (GUSTO) cohort. Energy intakes were recorded during Ad libitum test meals at ages 4.5 and 6 years old, alongside a series of oral processing behaviours coded from video recordings to quantify bite-size, chews per bite, time in mouth and eating rate (g/min). These measures were correlated with skin-fold anthropometry and MRI measures of abdominal adiposity (subset n= 153). Regression analyses indicated that children who had a faster eating rate at age 4.5 and 6, took larger bites, chewed less per bite and consumed more energy at each meal. The highest intake of energy at both time points was characterised by a faster eating rate in combination with a longer meal duration. Importantly, faster eating at 4.5 predicted faster eating (B=0.17, p= 0.016) and greater energy intake (B=0.21, p= 0.003) at 6 years. Children consistently took larger bites and chewed less at both time points, despite different foods being consumed. Children who ate faster at 4.5 years tended to show larger increases in measures of adiposity by 6 years. Faster eaters with longer mealtimes at 4.5 years had larger increases in prospective adiposity than slower eaters with shorter mealtime, emphasising a role for early oro-processing behaviours in prospective weight gain. These data highlight that faster eating is a consistent behaviour that contributes to increased meal size and adiposity in pre-school children and may be a potential target for future intervention.

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Assessing body fat among Malaysian children: skinfold prediction equations versus deuterium dilution technique

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Body fat assessment in children and adolescents is an important indicator of nutritional status. Prediction equations are widely used for the estimation of body fatness in clinical setting. To date, there are no reported studies that examined the validity of skinfold equations in predicting body fat among children in Malaysia. Hence, this study aimed to investigate the predictive validity of previously published skinfold equations in estimating body fat percentage (%BF) of Malaysian children. A total of 370 healthy Malay children (185 boys; 185 girls) aged 9-14 years participated in this study. Height, weight, skinfold at five sites (triceps, biceps, subscapular, iliac crest and medial calf) were measured. Deuterium dilution (D2O) technique was used as criterion method for estimation of total body water and fat-free-mass (FFM). Fat-mass was derived from the difference between weight and FFM, and %BF was then calculated. Among all skinfold equations, Bland-Altman analysis showed Lohman’s and Liu’s equations had closer absolute values with the least bias and small limits of agreement against D2O (boys: -4.3 to 1.7%; girls:-1.4 to -6.0%; ICC: 0.6-0.7). Slaughter’s and Deurenberg’s equations underestimated %BF with large bias and large limits.
of agreement (boys: -8.3 to -13.8%; girls: -11.0 to -16.3%; ICC: 0.4-0.6). In conclusion, previously published skinfold equations underestimated %BF of Malaysian children. Thus, we opine that population-specific skinfold prediction equations that can accurately estimate body fatness of Malaysian children needs to be developed for application in the clinical setting as well as in future studies.

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Birth weight and early growth (0-2 years) and the relationship to body composition and metabolic markers in young adults: Tanjungsari Cohort Study, Indonesia

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Introduction:
There is several evidence that birth weight and growth in early life are associated with risk of the metabolic syndrome in adulthood, although the relative importance of prenatal vs. postnatal growth for such associations remains controversial. Insulin resistance and body composition may play a key role in the ‘programming’ of such diseases, through itself being programmed by early growth, and perhaps also by being a mediator of the programming process.

Methods:
We investigated a sub-sample of 119 subjects (aged 20-21) from an original cohort of 3500 subjects in Tanjungsari Cohort Study, Indonesia. Univariate correlation and multivariate regression were used to examine association of birth weight and early growth with body mass index (BMI), waist circumference (WC), fat mass (FM), fat-free mass (FFM), body cell mass (BCM), and metabolic marker: total cholesterol (TC), LDL-cholesterol, HDL-cholesterol, triglyceride (TG), fasting blood glucose (FBG), HOMA-IR respectively. Early growth determined by calculate changes in SD scores between birth and two years were calculated for weight (scores at two years minus scores at birth). FM, FFM and BCM by multi-frequency bio-impedance analysis (Bodystat Quadscan 4000, UK).

Results:
Birth weight were positively correlated to WC (r=0.25, p<0.01), WHR (r=0.19, p<0.05), FFM (kg) (r=0.36, p=<0.001) and BCM (r=0.28, p<0.05). Early growth were positively correlated to WHR (r=0.2, p<0.05) and BCM (r=0.2, p<0.05). No correlation between birth weight and early growth with metabolic markers.

Conclusion:
Birth weight and early growth have correlation with some components of body composition but not correlated with metabolic markers.

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Weight and body mass change in relation to all-cause mortality in Korean: A nationwide population-based study

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Background:
Many studies have shown controversial results in the relationship between weight change and mortality. Therefore, we investigated the relationship between weight change and subsequent all-cause mortality using a large-scale population-based cohort from The National Health Insurance System (NHIS) health checkup data from 2005 to 2015.

Methods:
Total 11,524,763 subjects who were 20 years old were included (men= 6,327,210 and women = 5,197,553) The weight change was calculated as the difference of body weight during 4yrs which is between 1st and 3rd health checkup and we divided the weight change group into 8 categories from loss ≥ 15% to gain ≥ 20% for every 5% change. All-cause mortality was assessed 5.2±1.2 years after last weight assessment. The hazard ratios (HRs) and 95% confidence intervals (CIs) for all-cause mortality were analyzed using multivariable Cox’s proportional hazard models.

Results:
Weight loss caused more mortality than weight gain, and weight loss≥15% group had the highest HR of all-cause mortality (HR:95% CI=2.925;2.857-2.995) and HR of all-cause mortality in weight gain ≥ 20% was 1.788. In all BMI categories, weight loss ≥ 15% shows the highest mortality and the highest mortality was found in the BMI ≥ 30 kg/m2 group (HR:95% CI=3.665;2.361-5.689). Both weight stable group (normal to normal BMI group and obesity to obesity BMI group) showed reverse J-shaped mortality curve and sustained normal weight group showed higher HR of mortality in weight loss than sustained obese group.

Conclusions:
Impaired of inflammatory cell recruitment was one of the key factors for attenuating muscle regeneration in obese mice fed with high-fructose diet

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Background:
The quality and quantity of skeletal muscles are particularly important; not only for maintaining normal physiological functions, but also for preventing the individuals from insulin resistance. Moreover, obese individuals often demonstrated abnormal wound healing associated with immune dysfunction. We therefore analyzed the inflammatory cell infiltration during muscle regeneration in mice fed with high fructose corn syrup.

Materials and methods:
C57BL6/J mice were received ad libitum either with standard chow with water (NC) or with 10% high fructose corn syrup added in the drinking water (HFr) at 8-10 weeks of age. After 20 weeks of feeding, snake myotoxin was injected to the left tibialis anterior of the mice and left the right muscle as non-injured control. The ability of satellite cell activation, as well as inflammatory response were addressed by morphological and immunostaining assays.

Results:
After 20 weeks of feeding, body weight of HFr mice increased by 25% (41.2 ± 0.6 g) compared to that of the NC group (32.8 ± 1.6 g) with relatively normal blood glucose level (116 ± 9.5 vs. 111 ± 10.2 mg/dL). At day 3 post injury, there is no difference in the number of MyoD+ cells in HFr mice but dramatically reduced the number of inflammatory cells recruited compared to that of the NC controls. After 7 days of injury, the inflammatory cells were significantly accumulated in damaged muscle and prolonged desmin expression in regenerating fibers in HFr mice while the muscle of NC mice had been replaced by regenerated muscles with low desmin expression.

Conclusions:
The early activation of satellite cell was not hindered in obese mice while inflammatory cell infiltration was dramatically reduced. We hypotheses the muscle of obese individuals fail to secrete significant amount of cytokines to recruit inflammatory cells to the site of injury leading to attenuation of muscle regeneration.

The effects of prolonged sitting on vascular inflammatory mechanisms: implications for leukocyte adhesion and atherogenesis

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Background:
Higher levels of sedentary behaviour (sitting during waking hours) are associated with chronic low-grade inflammation; and, elevated risk of cardiovascular disease (CVD), diabetes, and all-cause mortality. Compared to regular active breaks from sitting, prolonged uninterrupted sitting acutely (over 1 day) amplifies postprandial glucose and insulin responses, alters the postprandial plasma lipidome, and impairs lower limb endothelial function (a predictor of CVD). We aimed to investigate the effects of an acute bout of prolonged sitting on vascular inflammatory mechanisms.

Methods:
In an on-going trial, 20 overweight/obese (BMI >25 kg/m2) adults (35-75 years) will complete two laboratory-based experimental conditions in a random order: (i) 5 h prolonged uninterrupted sitting (SIT); and (ii) 5 h sitting interrupted with 3 min of light-intensity simple resistance activities every 30 min (SRA). Plasma will be collected at baseline, 1, 2 and 5 h for analysis of soluble intracellular (ICAM-1 and VCAM-1) expression will be determined by flow cytometry. Preliminary Results:
Preliminary results from 7 participants are presented here. Completion of participant testing (n=20) and data analysis is anticipated by August, 2017. Plasma levels of circulating sVCAM-1 tended to be higher in SIT, compared to SRA, at 2h (696 ± 84 vs. 607 ± 43 ng/ml; p=0.14) and 5 h (670 ± 83 vs. 598 ± 35 ng/ml; p=0.28), respectively. No differences were observed for sICAM-1 levels.

Conclusions:
An increase in plasma sVCAM-1 levels with prolonged sitting may have implications for leukocyte adhesion and atherogenesis. This study will further investigate the ability of plasma to inhibit inflammation-induced coronary artery endothelial cell CAM expression ex vivo.

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Phenotypic characterization of Agouti related peptide (AgRP) neurons knock out mouse for the Carnitine palmitoyl transferase 1a (CPT1a).

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The hypothalamus is one key region of the brain in the regulation of the energy homeostasis. Two main neuronal populations in the arcuate nucleus: Agouti related peptide (AgRP) and the Pro-opimelanocortine neurons which when they are activated to lead to increase or decrease the food intake, the energy expenditure, the body weight, respectively. These neurons receive various metabolic signals including nutrients and hormones. Various sensors have been proposed to regulate these functions; mounting evidence displayed a role of enzymes involved in the fatty acid metabolism in these neurons in the integration of these signals. The Carnitine Palmitoyl transferase 1a (CPT1a) is a key enzyme involved in the pool of acetyl-CoA in the mitochondria by permitting the long-chain fatty acyl-CoA to enter in the matrix and undergo the beta-oxidation. To determine the role of CPT1a in the energy metabolism we breded AgRP$^{floxed}$-ires mice with CPT1a$^{floxed}$ mice to specifcally deleted CPT1a in the AgRP neurons compared to the wild type (AgRP$^{WT}$) mice. A complete phenotypic characterization was undertaken (body weight, food intake, body composition, plasma assays, metabolic parameters) in various metabolic conditions. Data were analyzed by Student’s t-test, two-way anova or two-way anova repeated mesure.Our results displayed that AgRP CPT1a$^{-/-}$ mice presented no difference in the body weight and body composition compared to the AgRP$^{WT}$ mice; however, in chow diet, these mice presented an higher food intake associated with a significant lower respiratory exchange ratio, and no difference for the energy expenditure or the physical activity compared to the control. In fed animals, no differences were observed in the energy metabolites and hormones; however, in fasted condition a significant hypercorticoseronemia, hypoleptinemia and hyperinsulinemia were observed in knock out group compared to the control group. Moreover, the AgRP CPT1a$^{-/-}$ mice displayed an higher sensitivity to the insulin compared to the control mice.

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Variety and cue-potentiated feeding

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Modern environments contain easy access to highly palatable foods that are advertised by salient cues reminding us of their availability. Instances where food cues successfully stimulate consumption – often despite satiety – are referred to as cue-potentiated feeding (CPF). Characterising when and how CPF occurs is critical to understand whether the effect contributes meaningfully to overeating and obesity. Studies of CPF in humans and rats suggest the effect is specific: food cues enhance consumption only of the food they have previously signalled. To explore this result further, the present experiments trained adult female rats to associate a distinct ‘Plus’ context with palatable food and another ‘Minus’ context with no food. Experiment 1 showed that the Plus context enhanced intake of the paired food but not a palatable alternative, consistent with previous studies. Experiment 2 assessed the effects of variety on CPF by comparing three groups that received either three palatable foods (Variety group), the same palatable (Single group) or bland food (Chow group) in the Plus context during training. When testing alternative palatable foods never previously presented in the contexts, the Variety group ate significantly more in the Plus than in the Minus context. By contrast, consumption was comparable across contexts for Single and Chow groups. In modern environments that are characterised by a diverse variety of foods, the present results indicate CPF may occur more widely than previously thought.

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Acute effects of morning and afternoon exercise on postprandial blood glucose regulation in overweight young adults with a family history of type 2 diabetes

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Aerobic exercise can decrease postprandial blood glucose responses in individuals predisposed to type 2 diabetes (T2D). Evidence indicates that daily diurnal rhythms exist in numerous physiological processes, including glucose metabolism. However, it is unclear whether the time of the day when exercise is performed differently affects postprandial glycaemic responses. We compared the acute effects of performing an aerobic exercise bout either in the morning or afternoon on postprandial blood glucose regulation. Currently, 8 young adults (age: 24.6 ± 3.7 yr, BMI: 29.2 ± 4.2 kg/m²) with a family history of T2D have undergone a two-day, randomised cross-over trial in which 30 min of moderate intensity cycling (65% of VȮ2peak) was performed at either 0800 h (AM condition) or 1600 h (PM condition) on day 1. Identical isocaloric breakfast, lunch, and dinner meals were provided at 0900
Is school community perception of weight status a barrier for addressing childhood obesity? A case study

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Introduction:
Schools are a target for childhood obesity prevention strategies, yet intervention effectiveness may be hindered by limited capacity within school communities to address the problem. We describe a case study with a sample of schools within Victoria, Australia where obesity prevalence was relatively high, to understand perceptions and preparedness to address childhood obesity.

Methods:
Anthropometric (height and weight) and self-report weight status were collected from 11-14 year old students (N=339 of 765; RR 45%) recruited from 42 schools in Victoria, Australia. Self-reported weight status was collected at the same time as measurement. Community readiness to address childhood obesity survey data were collected from staff (N=114) at participating schools with an emphasis on the readiness of the school community to address obesity. Objective versus self-report children’s weight status were compared. School readiness data were scored and descriptive analyses conducted.

Results:
Objective anthropometric data recorded forty-one percent of student participants as overweight or obese. Thirty-eight percent of students underreported their weight status, 17% of which were overweight or obese. School communities were generally concerned about the problem of childhood obesity, yet varied in their stage of readiness to take action. Perceptions of prevalence, promotion through education, and community engagement were prominent themes.

Conclusion:
Perceptions of childhood obesity prevalence may hinder prevention strategies. Childhood obesity efforts require a broader community approach beyond the school environment.

Are supermarket foods promoted to children healthy?

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Introduction:
There is substantial evidence that junk food advertising influences children’s food preferences and consumption, and is likely to contribute to overweight and obesity. In Australia, self-regulated industry codes on restricting junk food marketing to children, do not cover front of pack promotions. This study aimed to explore, the volume of animated characters likely to be appealing to children, on the front of food packaging of products aimed at children. It also aimed to assess how likely the characters were to contribute to overweight and obesity.

Methods:
An instore supermarket survey examined the presence of animated characters on cereal, snack bar, dairy snack and ice-cream products aimed at children. This was determined according to the serving size, appeal and nature of the product. These products were assessed for ‘healthiness’ using the FSANZ Nutrient Profiling Scoring Criterion (NPSC) (not meeting the criterion classed as ‘unhealthy’) and for sugar content (>15% sugar classed as ‘high’).

Results:
In total 389 products included were identified as being aimed at children. 158 of these carried animated characters. Half of the foods carrying animated characters (50%) were classed as ‘unhealthy’ and 64% were high in sugar. Within the food categories 19% of dairy snacks, 87% of snack bars, 32% of cereals and 88% of ice-creams carrying animated characters were ‘unhealthy’. While 17% of dairy snacks, 100% snack bars, 78% cereals and 88% ice-creams with animated characters were high in sugar.

Conclusion:
The high numbers of unhealthy and high sugar products identified in this study, that carry animated characters that are appealing to children, highlights a significant gap around regulation of marketing to children on front of pack which should be closed.
Banded Laparoscopic Sleeve Gastrectomy – Two year results.

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Introduction:
Sleeve Gastrectomy has now become a major part of bariatric surgery. Its effectiveness and quality of life has made it a popular choice amongst surgeons and patients. One of the main concerns however has been the durability of the operation and the risk of weight regain that may require a further intervention. To prevent this, adding a loose non adjustable silicone band (ring) to the initial procedure has been introduced.

Objectives:
The aim of this study is to assess the efficacy of this Banded LSG (BLSG) in terms of weight loss and to determine what the effect of the band is on weight loss.

Methods:
44 patients who received a BLSG were compared to 13 patients who received a LSG. All data of the included patients was retrospectively collected from personal health records and completed with data from phone calls with the patients. Differences in Body Mass Index, Total Body Weight Loss were analysed.

Results:
At baseline, mean age was 46.8 years (28-67) years for BSLG and 41.4 (24-59) years for LSG (control group). Mean BMI was 42.3 (31.2-76.0) for BSLG compared with 45.1 (38.3-54.6) for LSG. There were no intraoperative complications. At 24 months there was 80% Excess weight loss with LBLSG compared with 70% with the LSG.

Conclusion:
The BLSG is an effective bariatric procedure in terms of weight loss after two-year follow-up with results better than LSG alone. This study suggests that banding a sleeve gastrectomy may reduce stretch of the sleeve and create a more durable operation. Further prospective, randomized controlled trials need to be performed to make a definitive conclusion about the reflux subject and long-term studies need to be performed to evaluate if the band reduces pouch dilatation and thus reduces weight regain.

Sydney Bariatric Clinic Experience - Laparoscopic single-stage revision from adjustable gastric banding to sleeve gastrectomy and one anastomosis gastric bypass

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Introduction:
There is an increasing use of revision surgery following primary laparoscopic adjustable gastric band (LAGB) placement. The safety of laparoscopic single-stage revision (LSSR) compared to 2-stage revision is of interest to healthcare providers, patients and economists.

Objectives:
To review early (within 30 days) and late (> 30 day) complications of our consecutive LSSR cases from LAGB to sleeve gastrectomy (LSSR-SG) and one anastomosis gastric bypass (LSSR-OAGB).

Methods:
Retrospective analysis of our prospectively maintained database from November 2013 to May 2017.

Results:
We identified 131 patients who had LSSR surgery. The majority, 81.7%, of patients were female. Eighty-three patients underwent LSSR-SG (mean age 44.0 +/- 1.2 years, weight 108.4 +/- 2.9 kg and BMI 39.3 +/- 1.0 kg/m2) and 48 patients had LSSR-OAGB (mean age 44.4 +/- 1.5 years, weight 133.7 kg +/- 4.2, BMI 48.2 +/- 1.3 kg/m2).

Three patients re-presented with early complications: 1 following LSSR-SG, left portal venous thrombosis; and 2 following LSSR-OAGB; functional bowel obstruction (n = 1) and abdominal pain (n = 1). There were 2 late complications, both following LSSR-OAGB; small bowel obstruction (n = 1) and worsening renal function due to high oxalate absorption (n = 1). There were no leaks or deaths following LSSR-SG or LSSR-OAGB.

Conclusion:
None of the complications were thought directly related to the single-stage nature of the surgery. We believe both LSSR-SG and LSSR-OAGB are safe procedures that ameliorate the additional risks and costs associated with second stage surgery following LAGB.
Review of patients requiring iron infusions during a two year period (Jan 2013 – Dec 2014) in an Australian surgical centre.

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Background: Micronutrient deficiencies are a concern after bariatric surgery. Iron deficiency is common in this patient group regardless of surgical procedure. Iron deficiency can be treated effectively with oral supplements, however in some cases an iron infusion is warranted to correct iron levels in patients who don’t respond to or don’t tolerate oral supplements.

Methods: Pathology results from patients requiring iron infusions as a consequence of persistently low ferritin in a high volume bariatric surgery centre over a 2 year period were analysed. Patients referred for iron infusion were also referred for dietetic input.

Results: There were 214 revision procedures performed in this surgical centre during the 2 year period. 180 (84%) of these were revising LAGB to GB. Of the 39 patients requiring iron infusion, 13 warranted infusion prior to a primary surgical procedure (laparoscopic sleeve gastrectomy (LSG) or gastric bypass (GB)). The remaining 26 (66%) patients that received infusions were detected prior to revision bariatric surgery. 18 (46%) of these were conversion from gastric banding (LAGB) to gastric bypass (GB). Therefore 10% of the LAGB patients having revision surgery required an iron infusion to correct low ferritin.

Conclusion: LAGB has been widely performed in Australia in recent decades. Many patients with LAGB are now presenting for revision surgery as a consequence of insufficient weight loss, poor food tolerance and reflux. Often these patients have tolerated symptoms for some time before seeking further surgical intervention. They have commonly been lost to follow up by the multidisciplinary team and may not have had regular dietetic counselling. Our audit results indicate this patient group would benefit from long term follow up to identify poor food tolerance, detect deficiencies early and correct accordingly.

Early responders to liraglutide 3.0 mg as adjunct to diet and exercise from the SCALE Maintenance trial

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Background: The SCALE Maintenance trial randomised adults with obesity (BMI ≥30 kg/m2) or overweight (BMI ≥27 kg/m2) with comorbidities who lost ≥5% of initial body weight during a 4-12-week low-calorie diet (1200-1400 kcal/day) run-in period pre-randomisation to liraglutide 3.0 mg or placebo as adjunct to diet and exercise. This SCALE Maintenance trial post-hoc analysis compares outcomes in liraglutide 3.0 mg early responders (ERs) vs. early non-responders (ENRs) who completed 56 weeks’ treatment (ERs vs. ENRs; ≥5% vs. <5% weight loss at week 16 post-randomisation).

Materials and methods: Efficacy outcomes for liraglutide 3.0 mg ERs vs. ENRs are reported as observed means or proportions for individuals completing 56 weeks’ treatment. The safety analysis set was used for AEs.

Results: Randomisation mean characteristics (n=212) for participants on liraglutide 3.0 mg were: 46 years, 84% female, BMI 36 kg/m2. Of those completing 56 weeks’ treatment (n=159), 108 (68%) were ERs to liraglutide 3.0 mg and 51 (32%) ENRs. 91.7% ERs maintained their run-in weight loss (or lost further weight) during 56 weeks’ treatment vs. 47.1% of ENRs. The percentage of those regaining all weight lost during the run-in period by week 56 was 0.0% for ERs vs. 3.9% for ENRs. At week 56, greater mean (9.9% vs. 0%) and categorical weight loss (≥5%: 73.1% vs. 11.8%; >10%: 47.2% vs. 0%; >15%: 20.4 vs. 0%) and similar improvements in cardiometabolic risk factors, including waist circumference and plasma glucose levels, were observed in ERs vs. ENRs. AEs were reported in 92.7% of ERs vs. 91.0% of ENRs. For SAEs, proportions were 4.9% vs. 0.0% and for gastrointestinal AEs 78.9% vs. 62.7% for ERs vs. ENRs, respectively.

Conclusion: Among those who completed 56 weeks’ treatment, liraglutide 3.0 mg ERs achieved greater mean and categorical weight loss than liraglutide 3.0 mg ENRs, following ≥5% weight loss pre-randomisation.

A qualitative insight on nutrition and lifestyle behaviour among Malaysian adults with metabolic syndrome
National Health and Morbidity Survey 2015 has shown an increment of obesity rate among Malaysian adults over the last two decades. This reamplifies the findings on metabolic syndrome (MetS) research which indicated the country MetS prevalence to be among world highest with abdominal obesity as the most common risk factor. MetS awareness is very low among Malaysians hence there is limited information on health related behavioural risk factors needed to constitute a cost-effective and multi-faceted lifestyle intervention. To address this gap, a qualitative investigation on nutrition and lifestyle behaviours among adults with MetS was done using a series of semi-scripted focus group (FG). Attendees of a private clinic, MONASH Medical Precinct, were invited to join the study. Prior obtaining consent, they were screened for MetS using the Harmonized Criteria. Selected participants were invited to join a recorded FG session. Recordings were transcribed and thematically analysed based on the Health Belief Model (HBM) using Nvivo software. Six FGs involving twenty-one participants (Mean age: 51±10.3 years old) were done to achieve saturation. All participants were found to have abdominal obesity and hypertension while 90% have more than three MetS risk factors. Six themes were reported to be significant motivations and barriers for good nutrition and lifestyle behaviours among adults with MetS. Three behavioural barriers includes 1) limited knowledge on general wellbeing; 2) unaware about MetS risk factors and outcomes; and 3) concerns on primary care services. Consequently, three behavioural motivations are 1) a confidential peer and social support system; 2) continuous referral and support following diagnosis; and 3) sense of responsibility to protect self, family and community. Findings from our study provide a relevant input for an effective construct of a lifestyle intervention and to improvise prevention strategies for Malaysian adults with MetS.

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Initial Australian experience with endoscopic suturing for gastrojejunal outlet dilatation as a treatment for weight regain after roux-en-y gastric bypass

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Introduction:
Dilatation of the gastrojejunal anastomosis(GJA) is a significant risk factor for weight regain after Roux-en-Y gastric bypass(RYGB). We described the first Australian series of endoscopic suturing using the Overstitch device to correct GJA dilatation in 2016, which has reduced peri-procedural risk compared with revisional bariatric surgery. Advanced suturing techniques enable better GJA plication and could enhance outcomes.

Method:
Patients selected for endoscopic suturing had weight regain of ≥10% after RYGB and GJA stoma dilatation of ≥16mm on endoscopy. The procedure was performed under general anaesthesia. All patients stayed 1 night in hospital. Outcomes measured include complications, BMI and excess weight loss(EWL) achieved. Statistics are reported as a mean ± standard deviation.

Results:
30 patients underwent endoscopic suturing over 18 months(age 50±7.4 years, 28 female), using a variety of suture techniques for GJA plication. BMI prior to RYGB was 45±9 kg/m². Post operative nadir BMI was 31±6.4 kg/m². BMI at the time of endoscopic intervention was 37±6.3 kg/m². Time interval between RYGB and endoscopic intervention was 47.3±22 months. GJA aperture was 19.4±3.5mm. Procedure time was 74±13 minutes. Stoma size after suturing was 8±2.1mm with 2.1±0.8 sutures used. Dislodgement of sutures occurred in 11 patients where a simple interrupted suture pattern was used, associated with loss of satiety and a plateau in weight loss; all undergoing a second endoscopy for repeat suturing (median time interval 6 months).
Mean BMI change and EWL after Overstitch was 2.7±1.8 kg/m² and 26.8±20.8% respectively. Patients who underwent a single procedure had a greater BMI change and EWL compared with patients who underwent redo suturing (2.8±1.3 kg/m² and 32±22.6% vs. 1±1.4 kg/m² and 24.6±10.92%). No complications were reported.

Conclusion:
Endoscopic revision of the GJA is safe and associated with a positive trend in EWL. More durable GJA plication with advanced suturing techniques could yield better outcomes.

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The effect of nut consumption on markers of inflammation and endothelial function: a systematic review and meta-analysis

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Obesity is associated with chronic low-grade inflammation and endothelial dysfunction, which contribute to the development of cardiovascular disease (CVD). Biomarkers of inflammation and endothelial dysfunction in obese individuals may indicate changes in the progression and development of CVD, suggesting a need to focus more on specific foods in the diet which may help to ameliorate inflammatory responses. Habitual nut consumption is associated with decreased risk of CVD and coronary heart disease, although a range of effects have been found in clinical trials exploring the effects of nut intake on markers of 79
Factors that define people who have successfully self-managed weight loss

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Background:
Despite the number of weight management programs and their wide promotion, most overweight and obese individuals tend to lose weight on their own. This study sought to understand the characteristics and strategies of those who successfully engage in self-directed weight loss to facilitate the development of weight control plans that could empower other overweight and obese individuals with information and strategies to manage their weight on their own.

Methods:
Men and women who had lost at least 5% of their body weight without using the support of professionals or weight management programs were recruited. Demographic data was collected by questionnaire and participants’ weight loss experience explored using semi-structured interviews to elicit in-depth individual experiences and perspectives. Iterative thematic method data analysis was used to generate themes describing contributing factors to the success of self-directed weight loss identified by participants.

Results:
Most characteristics of those who successfully self-managed their weight loss were in line with those reported by successful weight losers participating in professional-led projects. However, strategies such as quick embedding of new lifestyle behaviours into daily routine; the ability to learn from previous unsuccessful weight loss experiences; and not requiring social and family support were identified as distinctive factors that contributed to the success of self-directed weight loss by participant’s of this study.

Conclusion:
Overweight or obese individuals with strong internal motivation, problem-solving skills developed from previous weight loss experiences, and self-reliance (not dependent on social support) are more likely to be successful at achieving self-directed weight loss. Patients identified with these characteristics could be encouraged to self-manage their weight loss process leaving places in more resource-intensive professional-led programs to those unlikely to succeed on their own.

Childhood obesity prevention – a whole-of-community systems approach

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Background:
Community-based interventions have shown promise in reducing childhood overweight and obesity and associated risk factors. However, they have been critiqued for their typically linear intervention logic, sustainability and scalability. Participatory community-based systems approaches have been posited as a way of addressing these limitations by allowing community members to create their own systems maps reflecting their understanding of the drivers of a particular issue in their community; and consequently developing and resourcing their own strategies and actions to influence these factors in the context of existing systems. Applying this approach to childhood obesity is in its infancy.

Aim:
To describe the process of a whole-of-community systems approach to childhood obesity prevention implemented in Victoria, Australia.

Methods:
Systems dynamics and a collective impact framework heavily informed the design of this intervention. An innovative approach using software and group model building (GMB) was implemented in a community in western Victoria. Three GMB sessions were conducted in 2015 which included action and implementation planning.

Results:
The first two GMB sessions included 10-30 key community leaders who were considered influential in areas of the community where children were involved in eating and playing. A systems map was constructed. The third GMB included 160 members of the wider community who continued to build this map, and identified action areas. Actions for each area were developed and prioritised. Working groups were formed to implement the priority actions. Case studies of actions implemented in the community resultant of the GMBs and further community development and systems work will be presented. E.g. breastfeeding promotion, family day care beverage policy, reducing SSB consumption at the local sports club.

Conclusion:
Understanding the process of implementing a new whole-of-community systems approach to childhood obesity prevention will provide knowledge to other communities how best to tackle childhood obesity.

Adolescent obesity – Concept, challenges and interim outcomes of the Danny's place program

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Background:
Determinants of obesity are multidimensional and influenced in part by early-life environments. Lifestyle intervention programs for adolescents with obesity are challenging and frequently report disappointing results with lack of published insights to guide development for effective practice-based models. We provide practical insights from lessons learnt in delivering the Danny’s Place™ integrated health model for the management of adolescent (10-18yrs) obesity.

Methods:
We delivered a 24-week family-centred adolescent weight-management program and examined the characteristics of the population including standard demographics (age, gender and weight), family dynamics and program retention. Perceived program benefits, based on feedback provided by families will also be thematically represented.

Results:
From March 2016 to March 2017, 20 adolescents aged 11-17.5yrs were recruited into the program (11yrsF,9yrsM). Baseline mean overall weight was 110.9kg (105.2kgF, 131.8kgM) with an overall change in weight of -1.8kg at 24 weeks (range: +8.5kg to – 30.6kg). The wide range in weight change over time is indicative of the challenges faced in keeping adolescents motivated to sustain change. Although there was 100% retention to week 24, frequency of contact with the team ranged between 2-4 weekly visits.

The family dynamic included 4 single-parent families and 2 ward of the state. Of the adolescents 4 were first child, 9 second children, 3 middle children and 2 were only child and 2 unknown (ward-of-the-state). Sibling comparisons and preferential treatments within families were identified.

Key themes emerging from family feedback surrounded the benefits of mobile messaging with program-coordinator support, health-provider access and interactive and practical education sessions. Challenges included referrals and continuity of counselling care for ward cases.

Conclusion:
The Danny’s Place 24-week program demonstrated, that with support for parents and adolescents with practical and real-life education sessions, adherence to the program is promising and that adolescents with obesity were able achieve positive lifestyle changes. These preliminary findings provide insights to future program development.

Patterns of discretionary food intake among adults with and without obesity: a study protocol

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Background:
Discretionary foods/beverages are highly palatable, inexpensive and ubiquitously available, making them easy to overeat. There is a stark departure from recommendations to consume them only ‘sometimes and in small amounts’, with intakes comprising 35% total energy of the average Australian diet (1). Comparing discretionary intake of healthy weight people to those with obesity may help to identify behavioural and dietary patterns associated with weight control.

Aim:
To compare patterns of discretionary food/beverage intake in adults with and without obesity.
Participants:
Healthy weight participants and participants with obesity will have a BMI of 19.0-24.9 kg/m² and ≥ 30.0 kg/m² respectively. Participants will be not be pregnant or breastfeeding, enrolled in a weight management programme, have previous bariatric surgery or a current eating disorder. Participants must be weight stable and have competent English literacy skills.

Methods:
Participants will complete a four day ‘Food & Sleep Diary’ and will underline foods and beverages they perceive to be discretionary. A mood questionnaire will be completed at the end of each day. Once the diary is complete, a dietitian will identify discretionary foods/beverages using the Australian Health Survey Users’ Guide. Participants will complete the Three Factor Eating Questionnaire and perception of diet quality questionnaire.

Outcomes:
This study aims to compare the amount (number of serves), percentage energy contribution, timing, weekend and weekday variation and form (food/beverage) of discretionary food/beverage intake between BMI categories. It will also assess the agreement between participant identified and dietitian identified discretionary food/beverages intake. The relationship between discretionary foods/beverage intake and sleep timing, mood, eating behaviour and perception of diet quality will be examined.

Hypotheses: Obesity is associated with greater daily serves of discretionary food/beverages, greater discretionary beverage intake and evening intake of discretionary foods/beverages.

Results: Preliminary results will be available at the time of the conference.


#waterwiththat: Consumer led action to improve drink offerings in children’s meals.

Alice Pryor
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The development of the Quick Service Restaurant Initiative for Responsible Advertising and Marketing to Children (QSRI) led to the large fast food chains change their advertising practises directed to children. This meant that many children’s meals were advertised as being served with water. The in store experience is quite different, with parents and children ordering the kids’ meals having to actively choose the healthier options.

Consumer advocacy group, Parents’ Voice, surveyed Australian parents and found that 89 per cent agreed that water should be the default option in kids’ meals.

With 47 per cent of Australian children consuming at least one sugary drink every day, the campaign #waterwiththat is urging all signatories to the QSRI to put water with their kids’ meals.

Campaigns Manager Alice Pryor will outline how Parents’ Voice have approached the campaign including the research basis and how Parents’ Voice have built support within the quick service restaurant industry.


Public support for government regulatory interventions for overweight and obesity in Australia

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Introduction:
There is growing recognition among public health circles of the need for regulatory action for overweight and obesity, but there has been limited research into whether the Australian public supports government intervention. This study aimed to determine the level of public support for food-related regulations for obesity, and to assess the determinants of support.

Methods:
A nationally representative sample of Australian adults (n = 2011) was recruited by market research company Online Research Unit to complete an online survey. The survey measured respondents’ perception of the obesity problem in Australia, and level of agreement on a 5-point Likert scale (strongly disagree to strongly agree) with proposed regulations in three food-related domains; advertising, sponsorship of children’s sport, and taxation. Pearson chi-square tests were conducted to test for differences in support between demographic groups.

Results:
The majority of respondents (92.1%) considered overweight and obesity to be a somewhat or very serious problem in Australia, and close to 90% felt there should be at least some government regulation to protect the Australian public. Over 72% of respondents agreed that government regulation should restrict unhealthy food and beverage advertising, with 81.1% supporting specific restrictions on advertising to children. There was less support for prohibiting food company sponsorship of children’s
sport (63.8% agreement), and for taxing sugar-sweetened beverages (57.3% agreement) and unhealthy foods (52.1% agreement). Support for fiscal policies slightly increased if the revenue was to be used for health purposes. Overall, respondents with a higher education more strongly agreed with proposed regulations (p < 0.05).

Discussion:
These findings suggest the majority of the Australian population recognises obesity to be a serious public health problem, and strongly support government regulation of our food advertising environment. Targeted advocacy work is needed to strengthen public support for other interventions such as taxation.

Rurality and family structure in Whānau Pakari: a multidisciplinary obesity intervention programme for children and adolescents

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5. Te Kupenga Hauora Māori, University of Auckland, Auckland, New Zealand
6. Department of Paediatrics, Taranaki District Health Board, New Plymouth, New Zealand

Background:
Whānau Pakari is a family-based, multidisciplinary obesity intervention programme for children and adolescents. It has achieved engagement with Māori and those from socioeconomically deprived households. The objective of this study was to assess the impact of rurality and family structure on outcome.

Methods:
Recruitment was from January 2012 – August 2016 in Taranaki, New Zealand. Eligible participants were 4-16 years old, with a body mass index (BMI) of ≥98th percentile (obese) or >91st centile (overweight) with weight related comorbidities. Primary outcome in the trial was BMI standard deviation score (SDS). Secondary analysis of BMI SDS, dietary behaviours, physical activity, and psychological outcomes was performed, as they pertained to rurality and family structure.

Results:
There were no differences in primary or secondary outcomes between urban and rural participants at baseline or 12 months. However, rural participants in a comparison group of children who did not proceed with Whānau Pakari displayed an increase in BMI SDS at 12 months from baseline. While there were low numbers of rural Māori in the cohort, background rates of rural Māori children and adolescents with obesity in Taranaki are not known. There were no differences in outcome in relation to family structure.

Conclusions:
Whānau Pakari appears to be acceptable for both urban and rural participants, and has overcome the challenges of varying family structures. Rural obese children who do not engage in Whānau Pakari are at risk of increased BMI SDS. Further research should focus on how to improve engagement with rural communities, especially Māori. Consideration of the optimal location for delivery of programmes for groups most at risk of child obesity is warranted.

The Nepean blue mountains lifespan family obesity service: A novel model of multidisciplinary care spanning from pre-conception to early pregnancy through childhood and adolescence into adulthood for individuals and families with severe obesity.

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Introduction:
The Nepean Family Obesity Service (NFOS) was established in early 2017 to address the rising rates of childhood and adult obesity in the Nepean Blue Mountains Local Health District (NBMLHD). The NBMLHD has one of the highest rates of obesity and Type 2 Diabetes-related hospitalisations with 60% of adults in the LHD being overweight and obese (Wentworth Healthcare PHN and the Committee for Sydney 2017).

The NFOS utilises a novel multidisciplinary Family model of care that includes clinics spanning the whole lifespan:
a) Early pregnancy (OPAL)
b) Childhood and adolescent (Kids Fit 4 Future)
c) Young adult (Pre-conception) and
d) Adult “Healthy Weight”, including clients with BMI >55kg/m².

Family members of clients referred to the NFOS with severe obesity, including children, siblings and parents, are all
encouraged to obtain a co-referral from their GP. The NFOS team includes expertise in obstetrics, paediatric and adult
docrinology and diabetes, nursing midwifery and diabetes education, nutrition and dietetics, clinical psychology,
physiotherapy and administration with research support from the Nepean CPC Research Hub and in collaboration with the
Wentworth Healthcare PHN.

Clinic environments are sensitive to the needs of our clients, including appropriately sized chairs and bariatric examination
beds. We have begun evidence-based individual and adult group programs to deliver the service. Where appropriate, the
service utilises the NSW Health “Get Healthy” coaching service (for 16yrs and above) and the Go4Fun ℗ Program (age 7-13
yrs) delivered locally by accredited NFOS team members.

Summary:
The Nepean FOS is a unique model of Family-based care that encompasses the whole lifespan. Ongoing analysis of the
service’s outcomes utilising a “Research into Practice” model of care is paramount to its long-term success and achieving the
service’s overall aim to improve the health and well-being of its clients while avoiding team “burnout” in its staff. Adolescent-
specific programs remain challenging.

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Exploring patients’ perspectives on obesity management while awaiting obesity clinic reviews
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Background:
Obesity is a major chronic disease burden in Australia. Nevertheless, obesity management is often complex and frustrating for
both doctors and patients. Obesity clinics are also usually overbooked with long waiting lists. There is little evidence on obesity
management while patients are waiting to attend an obesity outpatient service.

Aim:
This study aims to identify trends in weight change among Australian adults with obesity, and to explore their perceptions on
self- and primary care management of obesity during the clinic waitlist period.

Methods:
This study utilised a mixed methods approach. Quantitative data from surveys was used to inform subsequent semi-structured
interviews. Qualitative data from the interviews was analysed using the framework approach (Chronic Care Model) and
concepts from grounded theory.

Results:
45 participants were enrolled, where 7 attended follow-up interviews. Most patients gained weight (29%) or were unsure of any
weight change (29%). 27% lost weight whereas weight was unchanged in 15% of participants. The major themes identified
include self-management strategies, social support, patients’ expectations of primary care physicians (PCPs), the public
hospital system, and food and the emotional state.

Conclusion:
Improving obesity management during the clinic waitlist period could lead to better outcomes. Results from this study suggest
that interventions should include elements of the Chronic Care Model, particularly self-management skills on healthy eating and
emotional wellbeing. Patients and their families should also be linked to available community resources and support networks.
PCPs should be encouraged to act as an additional support person for patients. There is also a need to develop a more
effective communication interface to improve interactions between patients, PCPs, and the public hospital system.

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Myostatin and brown adipose tissue among young asian males
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Background:
Brown adipose tissue (BAT) dissipates energy as heat and contributes to energy expenditure. In animal model, myostatin (Mst)
knockout has been shown to drive browning of white adipose tissue, promote lean mass and increase total energy expenditure.
We explored whether BAT explain the variation in the relationship between lean mass and energy expenditure in humans, and
examined the relationship between myostatin, ethnicity and BAT.

Methods:
The Effect of UCP2 Gene Variation on Leptin Sensitivity and Lipid Profile in Indonesian Adults

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Introduction: Obesity has been associated with leptin resistance and this might be caused by genetic factors. The aim of this study was to investigate the gene-lifestyle interaction between -866 G/A UCP2 (uncoupling protein 2) gene polymorphism, dietary intake and leptin in a population based study. Because leptin has an ability to regulate energy metabolism and dietary intake, leptin sensitivity was determined by analyzing the interaction between leptin, body mass index and dietary intake.

Methods: This is a cross sectional study conducted in adults living at urban area of Yogyakarta, Indonesia. Data of adiposity, lifestyle, triglyceride, high density lipoprotein (HDL) cholesterol, leptin and UCP2 gene polymorphism were obtained in 380 men and female adults.

Result and Discussion: UCP2 gene polymorphism was not significantly associated with adiposity, leptin, triglyceride, HDL cholesterol, dietary intake and physical activity (all p>0.05). Leptin was lower in overweight subjects with AA+GA genotypes than those with GG genotype counterparts (p=0.029). In subjects with AA+GA genotypes there was a negative correlation between leptin concentration and total energy intake (r=0.324; p=0.0051) and this correlation was still significant after controlled for age, sex and body weight. The correlation between leptin and dietary intake was not seen in GG genotype (r=-0.111; p=0.188).

Conclusions: In summary, we showed how genetic variation in -866 G/A UCP2 affected individual response to leptin production. AA+GA genotype had a better leptin sensitivity shown by its response to dietary intake and BMI and this explained the protective effect of A allele to obesity.

Laparoscopic Mini-gastric bypass – an early Australia experience

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Introduction: Since its introduction in 1997, the Mini-gastric bypass (MGB) has become an increasingly popular bariatric procedure throughout the world. Despite published data over the following decades demonstrating comparable results to the Roux-en-Y bypass (RYB), the MGB has remained polarizing within the bariatric community. Over the past 5 years there has been growing popularity of the MGB is Australia due to its shorter operative time, positive learning curve and favorable side effect profile. This study investigates the early results for the MGB in an Australian setting.

Methodology: We present a retrospective study of the first 101 consecutive laparoscopic MGBs performed between March 2014 and May 2017 by two bariatric surgeons. Medical records were reviewed to ascertain pre surgery weight, metabolic conditions, demographic information, history of previous bariatric surgery and bypass length. Weight loss, resolution of metabolic conditions, short and long term complications and other adverse effects were analysed.

Results: 101 patients (42 male, 59 female) were reviewed with a mean follow up of 302 days (Shortest follow up 7 days, longest 1079 days). 59 patients (58.4%) had preoperative metabolic syndrome requiring medication and 43 of these patients (72.8%) had significant reduction in or cessation of medications postoperatively. Patients who were followed up for a year or more (n =37) had a mean weight loss of 79.23% of excess weight (mean follow up 550 days). 9 (8.9%) patients suffered significant...
complications including gastric pouch leak (2), marginal ulcer (2), anastomotic stricture (2), late conversion to RYB (2) and relook laparoscopy for bleeding (1).

Conclusion:
The MGB is a safe and effective bariatric procedure. Our early results show promising weight loss and resolution of metabolic conditions, with a low incidence of perioperative complications. The MGB should be considered a valuable component of the modern bariatric surgeon's repertoire.

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Bile Reflux after One-Anastomosis Gastric Bypass

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Introduction:
One-anastomosis gastric bypass (OAGB) is an increasingly popular procedure in Australia, with all the potential metabolic benefits of Roux-en-Y gastric bypass (RYGB), but with a lower complication rate comparable to that of sleeve gastrectomy. The slow uptake of this procedure is attributed to concerns surrounding bile reflux, although there is a paucity of data concerning its incidence, diagnosis and treatment. The purpose of this study was to review bile reflux post OAGB in a single surgeon experience in Australia.

Methodology:
A review of a prospectively maintained database of the first 82 OAGB was performed.

Results:
82 OAGB were performed between June 2014 and May 2017. There were 60 females with a mean age of 43 years and median preoperative BMI of 46.1 kg/m². 22 patients had undergone prior bariatric surgery (21 gastric banding, 1 sleeve gastrectomy), and 12 patients had concomitant hiatal hernia repair. Mean excess weight loss (EWL%) was 80% and 80% at 12 and 24 months respectively. One patient was lost to follow-up. 9 patients reported reflux symptoms postoperatively, of whom 4 had volume symptoms consistent with bile reflux. All 4 patients were subsequently converted to RYGB with complete symptom resolution. Of note, these 4 patients all presented within 12 months of their index OAGB operation. All had reported preoperative reflux, 1 was a revisional case and 2 had concomitant hiatus hernia repair.

Conclusion:
Bile reflux following OAGB requiring conversion to RYGB occurred in 4.9% (n=4) cases, with complete symptom resolution following conversion. This compares favourably to acid reflux following sleeve gastrectomy and internal hernias after primary RYGB. Preoperative acid reflux is a possible risk factor for bile reflux post OAGB. In this series, postoperative bile reflux was detected clinically within the first twelve months. More research is required into subclinical bile reflux and its potential long term implications.

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Trends of proton pump therapy use post laparoscopic sleeve gastrectomy

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Background
Functional UGI symptoms after bariatric surgery, especially acid-reflux symptoms are well-reported in literature. What has not been evaluated, is usage of proton pump inhibitors (PPI) after Laparoscopic Sleeve Gastrectomy (LSG). Dysphagia is another clinical entity that is not thoroughly studied post LSG. Furthermore, there is no current evidence correlating PPI therapy with dysphagia post LSG.

Objectives
To compare prevalence of PPI usage pre and post-operatively in patients that underwent LSG. To assess if self-reported dysphagia affects PPI usage.

Methods
101 consecutive patients that underwent LSG were retrospectively analysed. Contrast studies performed pre-operatively excluded hiatus hernia. Presence of pre-operative GORD and PPI use was recorded. At one year follow-up, all patients completed a clinically validated dysphagia assessment questionnaire.

Results
Overall, pre-operatively 16 of 101 patients were on PPI therapy. At follow up of one year or greater, 20 patients were found to be on PPI which is a significant increase (p=0.01).

Conclusion
Logistic regression analysis revealed the odds of requiring PPIs one year after LSG is 4.3 [95% CI 1.36-13.62] times higher in patients on PPI therapy pre-operatively. Patients on PPI at follow-up also revealed significantly higher dysphagia scores by 2 points (p=0.043).
Assessment of dysphagia and impact on weight outcomes post-surgery

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Background
Dysphagia can be a subjective symptom, which can be influenced by many anatomical and physiological factors. In addition to this, other concomitant processes such as reflux may contribute. There are few well-defined methodologies and accepted scoring systems for dysphagia. Most widely published reporting systems do not adequately assess the functional and emotional impact of dysphagia. Furthermore, few have reported prevalence of dysphagia post bariatric surgery, as its own clinical entity, without being examined under the umbrella of reflux disease.

Objectives
To assess prevalence of dysphagia, post Laparoscopic Sleeve Gastrectomy (LSG) using a validated patient-reported tool, DHI (Dysphagia Handicap Index). DHI measures the handicapping effects of dysphagia on emotional and functional domains.

Methods
124 patients one year or more post LSG were contacted using email and phone follow-up. 101 patients responding to the DHI (81.5%). Post-operative weight outcomes were calculated. Physical, Emotional and Functional subscales were analysed combined as well as separately. To further delineate oesophageal dysphagia, three additional questions were added to the DHI.

Results
Average pre-operative weight and BMI is 123.9 kg and 43.1 kg/m², respectively. The average reduction in BMI at one year or more was 13.1 kg/m². 58 patients reported none to mild dysphagia (57.4%) and 43 reported moderate to severe dysphagia (42.6%). No patient required pneumatic dilatation. The median reported DHI subscale scores are: Physical subscale – 4 (0-26), Functional subscale – 4 (0-22), Emotional subscale – 2 (0-14). On multivariate analysis, when all other variables are held fixed, for each point increase in DHI Emotional subscale, %TWL was 1.1 points lower (median %TWL 32%, p=0.001) and %EWL was 2.10 points lower (median %EWL 77%, p=0.023). High DHI Emotional scores are found to be associated with poorer weight loss outcomes.

Conclusion
Dysphagia post LSG was commonly reported. While physical symptoms of dysphagia did not...
Surgical management and long-term follow up of oesophageal perforations

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Background – Oesophageal perforations, especially spontaneous perforations (Boerhaave Syndrome (BS)) are associated with high morbidity and mortality, particularly when there is a delay in diagnosis. There is a lack of consensus in literature regarding surgical management algorithms. There is also negligible data on long-term follow-up and quality of life (QoL) of survivors of oesophageal perforations.

Aim – This study aims to report on surgical management and long-term QoL outcomes of seven patients that underwent single stage surgery for oesophageal perforation in specialised upper gastrointestinal units.

Methods – Five patients with BS and two patients with iatrogenic perforation were retrospectively analysed from a single surgeon series over a two year period. Time to surgery and operative technique were recorded. Complications and length of stay (LOS) documented. All patients were contacted greater than three years after to assess for dysphagia, reflux disease, proton-pump therapy (PPI) use. All patients completed the SF-12 questionnaire; a validated patient-reported measure of health perception and QoL.

Results – The mean age was 49.6 years (range 17-75). All patients underwent surgery within 24 hours of symptom onset. The operative approaches for BS are as follows: Four patients had midline laparotomy with oesophageal and mediastinal access via hiatal dissection. One patient had a bilateral thoracoscopic approach with drainage. When possible, oesophageal myotomy and primary closure was performed. Of the two patients that had iatrogenic perforation, one patient had a laparotomy, mediastinal lavage and stent insertion. The second patient had endoscopic clip repair.

Conclusion – There are many approaches available to manage oesophageal defects. These will vary according to injury factors (such as site, severity, circumference involvement), institutional/surgeon factors and patient factors. However, we have demonstrated a high salvage rate with favourable long term outcomes with early intervention.

Single anastomosis bypass: One year results from 100 consecutive patients

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Purpose: Laparoscopic single anastomosis is an alternative to the laparoscopic Roux-en-Y bypass, which is considered the gold standard in the treatment of morbid obesity. We look at the 12 month outcomes of our first 100 patients from 2014-2016.

Method: A retrospective review of a prospectively collected database of 100 patients undergoing laparoscopic single loop anastomosis performed by two surgeons. Morbidity, weight loss and comorbidities were assessed. Weight loss was assessed as a percentage of excess weight loss. Follow up was assessed up to 24 months post-operatively.

Results: There were 71 females and 29 males. The average pre-operative BMI was 47.1. Comorbidities included diabetes mellitus (65%), hypertension (43%), Sleep apnoea (27%) and dyslipidaemia (30%). 21% of patients had a prior history of either gastric banding or sleeve gastrectomy. There were no deaths. Morbidity was 8% with 1 anastomotic leak, 1 internal hernia, 2 marginal ulcers and 4 anastomotic strictures. Mean excess weight loss percentage was 44%, 63.7% and 79.5% at 3, 6 and 12 months respectively. 90% of patients with diabetes were off treatment at 12 months and 100% had improved diabetes control.

Conclusions: Single loop anastomosis bypass is a safe and effective procedure with excellent weight loss and co-morbidity resolution, particularly diabetes.

Efficacy of an intensive lifestyle and medical treatment for severe obesity in the public hospital setting: a case series

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Background: We investigated the efficacy of an intensive multidisciplinary treatment for severe obesity over 12-months, called the Metabolic Rehabilitation Programme (MRP), in a public hospital clinic.

Methods: We extracted data from medical records for 52 eligible patients (44% men) with a body mass index (BMI) ≥35kg/m2 (27%, 54%, and 19% with a BMI ≥35-39, ≥40-49, and ≥50, respectively) referred to the MRP from 2009-2016. Clinical outcomes were changes in weight, glycosylated haemoglobin (HbA1c%) and systolic blood pressure (SBP) at 3, 6 and 12-months. Predictors tested were: age, gender, exercise sessions, BMI, waist circumference (WC), blood pressure, HbA1c, diabetes history, and
Management of obesity (sthaulya) by Lekhana Basti (emaciating/desiccating medicated enema)

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Obesity leads to severe threat to health which causes Hypertension, Diabetes Mellitus, cardio vascular diseases, osteoarthrits etc. Obesity is not only a cosmetic problem. Acharya Charakra gave the methodology of Sthaulya which can be correlated with obesity. Permanent solution is needed for this serious problem.

Ayurveda, the 5000 years old science of healthy living has solution to this current problem without any side effects to the individual. These should be a major shift in awareness. Ayurveda does not treat obesity; it treats a person who is obese.

Panchkarma (five purification procedure) is said to be very effective treatment for any diseases although there are many treatments available. So, present study was carried out to evaluate efficacy of Lekhana Basti (emaciating/desiccating medicated enema) which is the prime and said “half treatment” among all procedures. It was described by Acharya Sushruta.

15 patients were selected and were given treatment in a special schedule of 15 days. After 15 days assessment was done, Lekhana Basti played significant role in all parameters of obesity without side effect.

Highly significant results were achieved in BMI, Weight Gain and all other subjective parameters and also in objective parameters like chest, abdomen, arm, mid-call circumference and skin fold thickness etc. Complete remission was found in 13.33% of the patients, marked improvement in 40.0% and Moderate improvement was found in 46.67% of the patients.

Low testosterone and clinical outcomes in Chinese men with type 2 diabetes mellitus - Hong Kong Diabetes Registry

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Aims: To assess the implications of low testosterone on cardiovascular risk factors, metabolic syndrome (MES) and clinical outcomes in Chinese men with Type 2 Diabetes (T2D).

Methods: A prospective cohort study carried out in a university hospital involving a consecutive cohort of 1239 Chinese men with T2D (aged 58.61±11.54 years) and a median disease duration of 9 years (inter-quartile-range[IQR] 4-16 years) followed up for 4.8 years (IQR 4.4-5.6 years). Clinical characteristics, frequency of MES, serum total testosterone and clinical events were analyzed.

Results: More men with low testosterone had cardiovascular-renal disease and MES than those with normal testosterone. The adjusted odds ratio (OR) of low testosterone for MES was 2.63 (95% Confidence Interval [CI] 1.56-4.61). After a median follow-up of 4.8 years, the hazard ratio (HR) of low testosterone was 2.18 (95%CI 1.30-3.64) for all-cause mortality and 2.28 (95%CI 1.28–4.07) for incident all-site cancer. In a multivariate Cox-regression model, these HRs were attenuated but remained significant with adjustment for age and MES but rendered non-significant when renal parameters were included.

Conclusions: Chinese men with low testosterone had high prevalence of cardiovascular disease and MES with high incidence for premature death and all-site cancer, in part mediated by renal dysfunction.
Association between dietary quality and obesity in Chinese adults with type 2 diabetes

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Background:
Diet is pivotal in the management of obese patients with type 2 diabetes (T2D). We aimed to examine the association between dietary quality and obesity in Chinese adults with T2D.

Methods:
Chinese adults with T2D who had undergone comprehensive diabetes assessments at a university-affiliated hospital between April and November 2016 were invited to join this study. Participants were categorized into non-obese (body mass index [BMI] = 18.5–24.9 kg/m²) and obese (BMI ≥30 kg/m²) groups. Four dietary quality indices, including Alternate Healthy Eating Index 2010 (AHEI), Dietary Quality Index-International (DQI-I), Dietary Approach to Stop Hypertension (DASH) diet score and Mediterranean Diet Score (MDS), were derived from the dietary intake data collected by a validated food frequency questionnaire.

Results:
A total of 211 Chinese T2D (54.5% men, mean age ± standard deviation = 54.0 ± 8.6 years, mean disease duration of diabetes = 8.4 ± 7.7 years) were recruited. Compared with the non-obese group, the obese group had significantly higher total energy intake (2158.9 ± 547.2 kcal vs. 1889.0 ± 442.1 kcal), lower vigorous and moderate physical activity days (1.02 ± 1.85 days vs. 2.02 ± 2.62 days), AHEI-2010 (57.8 ± 11.3 vs. 63.08 ± 12.15), DQI-I (51.70 ± 7.03 vs. 54.3 ± 7.79) and DASH diet score (21.7 ± 4.8 vs. 23.5 ± 5.4) (all p<0.05), but no difference in MDS. After adjusted for sociodemographic covariates, anti-diabetic medications and physical activity level, AHEI, DQI-I and DASH diet score remained to be inversely associated with obesity (all P<0.05). However, such associations became insignificant after further adjusted for total energy intake.

Conclusion:
Low dietary quality was associated with obesity in Chinese type 2 diabetic adults and its effect was attenuated by total energy intake. Our results suggest that both dietary quality and energy restriction are pertinent in planning and implementing dietary intervention for obese T2D.

Adherence to the Mediterranean style diet is inversely associated with severe nonalcoholic fatty liver disease in obese Chinese adults with type 2 diabetes

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Aims:
The prevalence of nonalcoholic fatty liver disease (NAFLD) in patients with type 2 diabetes (T2D) is high and linked with poor prognosis. We aimed to explore the association between the adherence to the Mediterranean style diet and the severity of NAFLD among obese Chinese adults with T2D.

Methods:
A total of 103 obese T2D Chinese adults with body mass index (BMI) ≥30 kg/m² and no history of excessive alcohol drinking received comprehensive diabetes-related complication assessments and underwent an ultrasound examination of fatty liver in a university-affiliated hospital. Dietary intake was assessed using a validated semi-quantitative food frequency questionnaire. Adherence to the Mediterranean style diet was estimated with the Mediterranean Diet Score (MDS) (score range from 0-9 points).

Results:
NASH was present in 97 (94.2%) subjects of the study cohort (53% male, mean age = 52.3 ± 9.1 years, mean BMI = 34.6 ± 4.3 kg/m²). A total of 27 (26.2%), 56 (54.4%) and 20 (19.4%) subjects were graded as ‘no or mild’, ‘moderate’ and ‘severe fatty liver’, respectively. Compared with the ‘no or mild’ and ‘moderate’ groups, the ‘severe fatty liver’ group was higher in systolic BP, diastolic BP, glycaemic control, triglyceride and alanine transaminase after adjusting for age and gender (all p-value <0.05). Using logistic regression models, MDS was independently and inversely associated with the presence of severe NAFLD after adjustment for potential confounders (p-value = 0.008). The odd ratio was 0.47 (95% confidence interval: 0.27-0.82) for every 1 point increase in MDS.

Conclusion:
Adherence to the Mediterranean style diet had an inverse association with the presence of severe NAFLD among obese Chinese adults with T2D. Lifestyle strategies addressing Mediterranean style diet may be warranted in managing NAFLD in this patient population.
Using the protein sparing modified fast diet in the treatment of Rohhad Syndrome: A case study.

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Background:
ROHHAD (rapid-onset obesity with hypothalamic dysregulation, hypoventilation, and autonomic dysregulation) is a rare, life threatening syndrome affecting approximately seventy-five people worldwide, two of which are patients being treated at The Children’s Hospital at Westmead (CHW). Patients with ROHHAD are challenging to manage as the obesity does not respond to standard dietary restriction and weight management advice.

Methods:
A Protein Sparing Modified Fast (PSMF) diet has been used at SickKids in Toronto, Canada and shown to be effective. The diet consisted of 2-2.5g/kg of protein per day calculated as protein equivalent exchanges. Carbohydrate intake was limited to 20-30g carbohydrate per day from vegetable sources. Vitamin and mineral supplementation was included to ensure adequate intake. Fluid intake was set at 2-3L per day.

Results:
Both patients (aged 9 and 6) at CHW were placed on a PSMF diet, commencing on stage 2. After 6 months of adherence to the diet both patients had a reduction in weight of 10kg. This was the first-time weight loss had occurred since diagnosis. Parents reported an improvement in the child’s hyperphagia and an improvement in overall behaviour and concentration.

Both patients saw a rapid increase in their weight gain whenever the diet was relaxed and the carbohydrate content increased to over 50g per day. Bimonthly appointments, family wide changes and specifying appropriate food products available were shown to improve dietary adherence.

Conclusion:
PSMF diets were effective in two paediatric patients being treated at the CHW for ROHHAD. Reduced adherence to the diet resulted in weight gain indicating the need to stay on the diet long term in order for weight to be controlled. Regular appointments, support and guidance (recipe ideas and meal plans) are necessary to ensure adherence and dietary variety.

Fast Track to health: a randomised controlled trial investigating the use of modified alternate day fasting in adolescents with obesity. A protocol

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Background:
One in four Australian adolescents has overweight or obesity with increasing rates of severe obesity. Effective treatment is vital and novel approaches are required. Modified Alternate Day Fasting (MADF) diets in adults are as effective as continuous energy restriction. MADF, with shorter periods of energy restriction and days of habitual energy intake may be more sustainable for adolescents. The aim of this randomised controlled trial (RCT) is to determine if MADF results in a lower BMI z-score after 52 weeks of intervention in adolescents with obesity, compared to a standard hypocaloric diet.

Methods:
We will recruit 186 (93 each arm) adolescents with obesity from Sydney and Melbourne. All participants will undergo a Very Low Energy Diet (VLED) for 4 weeks during Phase 1 of the study. Participants will consume 3-4 meal replacements per day and one low carbohydrate meal. During Phase 2 (weeks 5-16), participants will be randomised to MADF (experimental arm) or a standard hypocaloric diet (active control arm). The MADF protocol includes a VLED 3 days/week (500-600kcal/day) and a standard healthy diet 4 days/week. The standard hypocaloric diet is high fibre, with 40-50% energy from carbohydrate and 20-25% energy from protein, with prescriptive energy levels based on age: 6000-7000kJ/day for 13-14years and 7000-8000kJ/day for 15-17years. Participants will regularly consult with a dietitian, with additional support via phone, text and social media. The primary outcome is change in BMI z-score at 52 weeks.

Discussion:
Obesity during adolescence is associated with increased risk of diabetes and cardiovascular disease into adulthood. This RCT will be the first to compare MADF with a standard hypocaloric diet in adolescents with obesity. Results will inform clinical practice and may assist in reducing cardiometabolic risk factors in this population.
Evaluating gastrointestinal (GI) peptides as markers of satiety in dietary intervention studies:
how informative are the ‘satiety’ peptides?

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Multiple mechanical or chemical stimuli originating in the gastrointestinal (GI) tract are involved in the regulation of satiety and food intake. Arrival of nutrients into the gut results in the release of peptides which, along with the activation of neural signals, have long been hypothesized to alter appetite-related sensations and eating behaviour1,2. While these peptides have specific roles in digestion, absorption and metabolic fate of nutrients the physiological role they play in regulation of ingestion and eating behaviour is less well understood and the causative relationship has been challenged3. A literature research was conducted evaluating change in circulating CCK, GLP-1, PYY and satiety following endogenous (changes caused by diet) and exogenous (changes caused by pharmaceutical infusion) interventions. Relative changes in peptide concentrations were compared to identify the physiological relevance of these ‘satiety’ peptides.

Online literature search retrieved 128 dietary interventions from 44 published articles reporting baseline and postprandial peptide concentrations, and 38 pharmaceutical (infusion) interventions from 20 published articles. Baseline concentration of CCK and GLP-1 were similar between both study groups, whilst PYY had a wider range reported in the dietary studies. Peak hormone concentration (Cmax) was significantly lower following diet intervention for all peptides when calculated both as maximum value (mean ± SEM pm. GLP-1: diet 16.9±0.5, drug 36.2±3.0; PYY: diet 47.3±1.4, drug 78.2±3.1; CCK: diet 3.23±0.1, drug 17.8±1.3; P<0.001, all); and as fold increase above baseline (fold change, GLP-1: diet 1.9±0.01, drug 6.3±0.3; PYY: diet 1.9±0.03, drug 4.7±0.2; CCK: diet 3.0±0.1, drug 11.0±1.2; P<0.001, all). Whilst there was overlap in range of response between diet- and pharmaceutical-induced levels of all three peptides, diet studies consistently resulted in lower concentrations. Inability to attain a satiety-associated ‘threshold’ may explain the lack or variable response to a meal in many diet studies investigating appetite response.


Short-term effects of providing high-fat versus high-carbohydrate meals on physical activity patterns

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The provision of meals for dietary control is a well-established practice in studies investigating physiology and measuring mechanistic outcomes. However, the extent to which meal provision of different compositions at set times influences blood glucose regulation and physical activity patterns, compared to habitual dietary intakes and activity patterns is not known. We aimed to test the hypotheses that the provision of differing food meals would not alter daily activity patterns.

Eight sedentary, overweight/obese men (age: 36±4 y, BMI: 30±2 kg/m²) participated in the randomized crossover study. Participants completed a 7-day habitual recording period followed by 5 days of each dietary intervention (HFD: 15% total energy intake (TEI) carbohydrate, 67% TEI fat and 18% TEI protein vs HCD: 67% TEI carbohydrate, 15% TEI fat and 18% TEI protein). Throughout both the Habitual and Intervention periods energy intake and physical activity patterns (ActiGraph accelerometer) were assessed.

The average 7-day habitual intake was 43±14% TEI carbohydrate, 35±7% TEI fat and 22±9% TEI protein. Across total accelerometer wear time, HFD provision increased sedentary (<100 counts per minute (cpm)) time (P=0.006; +7%, 95%CI:2–11 %) and reduced light (100-1951 cpm) activity time (P=0.01; -8%, 95%CI:-10–2%) compared to the Habitual period. Conversely, the HCD provision tended to reduce sedentary time (P=0.078; -4%, 95%CI:-9–0.5%) and increased light activity time (P=0.03; +5%, 95%CI:1–10%) compared to the Habitual period. No differences in sedentary or light activity time was measured between Habitual periods prior to each diet, nor was there a difference between conditions for moderate–vigorous physical activity at any time.

These preliminary findings indicate that dietary provision (altering habitual macronutrient intake) leads to changes in habitual sedentary and light activity patterns. Therefore, the impact that dietary control has on habitual activity patterns should be considered in investigations where dietary control is required for assessing underlying mechanisms.
Assessing risk associated with subcutaneous and visceral adiposity measured by dual energy x-ray absorptiometry (DXA) and magnetic resonance imaging (MRI): the TOFI_Asia study

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The Peak Nutrition for Metabolic Health (PANaMAH) platform, is one of four priority research platforms in the New Zealand National Science Challenge (NSC) program, investigating metabolic susceptibility and resilience to type 2 diabetes (T2D). Site of lipid deposition has long been associated with modulation of metabolic risk. In adults with low body mass index (BMI) and total adiposity, the thin on the outside fat on the inside ‘TOFI’ profile may predispose to poor glycaemic control and increased risk of T2D. Characterised by ectopic lipid storage at key sites, purported to be due in part to lipid overspill from safer peripheral stores1, growing evidence shows Asian adults to be at particular risk compared to gender and age matched Caucasian counterparts. High levels of visceral fat has also been associated with decreased peripheral insulin sensitivity and increased hepatic insulin resistance, and can be predictive of fat accumulation in liver and pancreases2. Whilst total body, abdominal and visceral adiposity can be accurately measured using dual energy x-ray absorptiometry (DXA), magnetic resonance imaging (MRI) and spectroscopy (MRS) are required to quantify ectopic lipid3,4. However there is a paucity of data that assesses the relationship between fat content of abdominal and visceral compartments measured by the two methodologies. In a cohort of 70 healthy and prediabetic, lean and overweight, Asian Chinese and Caucasian women (aged 44.7 ± 14.3; BMI 27 ± 4.3 kg/m2), abdominal and visceral fat/adiposity from DeXA, (fat mass) and 3 Tesla Chemical shift MRI (fat volume) was compared. Furthermore the impact and quantitative role of visceral fat on indices of glycaemia (fasting plasma glucose, FPG, glycated haemoglobin, HbA1c) was determined.


Multiple enterotomies caused by migration of eroded laparoscopic adjustable gastri band into jejunum

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Introduction:
Recent literature has suggested that the complication rate for laparoscopic adjustable gastric band (LAGB) is high, with up to 40% of patients experiencing major complications including band erosion (28%)1. We present a case of multiple enterotomies caused by LAGB erosion and migration requiring laparotomy with small bowel resection and complicated by psoas abscess.

Case:
A 68 year old male presented to the hospital with four days of abdominal pain but otherwise clinically well and a background of LAGB in 2007. An abdominal CT demonstrated a LAGB tubing passing intraluminally through the lesser curvature. The LAGB itself was situated within the lumen of the proximal jejunum. The jejunum proximal to the LAGB was distended and gave a concertinaed appearance on the axial images. There was no pneumoperitoneum.

Management was by laparoscopy, however an unexpected finding of multiple existing enterotomies was made requiring extension of the laparotomy and small bowel resection.

Discussion:
We believe that whilst cases of bowel perforation associated with LAGB erosion and migration are reported a case of multiple enterotomies has not. We believe that as the band migrated through the jejunum it reached a point where it acted as an anchor and the continued peristalsis of the bowel resulted in the unique concertinaed effect on the bowel which in turn caused the multiple ischaemic enterotomies. This same concertinaed effect on the bowel was responsible for containing the perforations and resulted in the patient appearing well clinically. It may easily have transpired that the enterotomies may have been missed and left in-situ. We believe that in cases such as this clinicians must maintain a high suspicion for bowel perforation and have a low threshold for progression to laparotomy. The post operative course of the patient was complicated and resulted in significant morbidity.
Retained foreign body after surgical removal of adjustable gastric band

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Laparoscopic adjustable gastric band is associated with significant weight loss and comorbidity resolution. There is however, a high re-operation rate when compared to other obesity surgeries. Removal of adjustable gastric band is an increasingly common bariatric procedure. This leads to a risk of potential complications including retained foreign body. We present a case series of four cases of retained foreign body after surgical removal of a gastric band. Three cases of unrecognised retained foreign body complicating surgical removal of gastric band and one case of recognised retained foreign body complicating endoscopic removal of gastric band were identified in a metropolitan Australian obesity surgery practice. These cases were analysed to determine circumstances and similarities leading to retained foreign body. Retention of band tubing was often associated with unexplained postoperative abdominal pain although some cases were asymptomatic. Three of four cases involved difficult surgery, or surgery associated with intra-operative complications and it is postulated that this may lead to increased risk of retained foreign body from gastric band. While radiological imaging demonstrated the foreign body in all cases, imaging was often misleadingly and incorrectly interpreted by radiologists. In patients post removal of gastric band devices who present with atypical or persistent postoperative pain, particularly localised pain, a review of radiological imaging by the surgeon is essential. Furthermore, strategies at preventing this complication should be implemented. Specifically, removal technique, device familiarisation and post removal inspection all play a role.

Factors predicting glycemic control and diabetes remission after sleeve gastrectomy and gastric bypass in a multiethnic Asian cohort.

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Introduction:
In Asia, the rate of metabolic-bariatric surgery (MBS) has grown rapidly in parallel with rising obesity and type 2 diabetes mellitus (T2DM) rates.

Objectives:
To identify factors that influence glycemic outcomes and diabetes remission at 12 months after sleeve gastrectomy (SG) or gastric bypass (GB) in a multi-ethnic Asian cohort.

Methods:
Data from patients with T2DM who had SG (41%) or GB (59%) at a single centre in Singapore with at least one year follow-up were analysed. Remission was defined as HbA1c of 6.0% or lower without diabetes medications. Analysis involved binary logistic regression to identify predictors and general linear regression was used to identify independent variables associated with glycemic improvement after MBS.

Results:
207 patients were included in the study. Mean age was 45.7 years, baseline BMI 41.2 kg/m2, HbA1c 8.3% and duration of diabetes was 8.6 years. Diabetes remission was achieved in 73 patients (51.8%) at one year. Duration of diabetes (OR 0.87, 95% CI: 0.79-0.96, p=0.005) and baseline HbA1c (OR 0.37, 95% CI: 0.20-0.69, p=0.001) were significant pre-operative factors associated with diabetes remission. At 12 months, total percentage weight loss was 24.0% after SG and 25.8% after GB (p=0.156). Greater reduction in HbA1c was seen with GB compared to SG (2.7% vs. 1.9%, p=0.001), which remain significant even after adjustment for weight loss, age, BMI, baseline HbA1c and duration of diabetes (p=0.011). Weight loss at 12 months also correlates with HbA1c reduction. Ethnicity was not significant factor in predicting diabetes remission, glycemic control or weight loss after MBS.

Conclusion:
Baseline HbA1c levels and duration of diabetes are independent factors that predict diabetes remission after MBS. GB is more effective in controlling T2DM compared to SG despite similar weight loss. Ethnicity does not play a significant role in modulating weight loss or glycemic response to MBS.

Change in use of sleep medications after gastric bypass surgery or intensive lifestyle treatment in obese adults

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This study aimed to investigate the change in use of sleep medications after bariatric surgery or intensive lifestyle treatment in obese adults.
Background:
Obesity is associated with sleep problems and use of sleep medications. Intentional weight loss is known to improve a range of sleep problems, but its effect on use of sleep medications is unknown. We aim to examine the change in use of hypnotics/sedatives in two obese cohorts; one undergoing gastric bypass surgery, and the other intensive lifestyle modification.

Methods:
Obese adults who underwent gastric bypass surgery or initiated intensive lifestyle modification between 2007 and 2012 were identified through the Scandinavian Obesity Surgery Registry and a Swedish commercial weight loss database, respectively. The two cohorts were matched on body mass index (BMI), age, sex, education, history of hypnotics/sedatives use, and treatment year (surgery n=20,626; lifestyle n=11,973; 77% women, mean age 41 years, mean BMI 41kg/m²). The proportion of participants with filled hypnotics/sedatives prescriptions, and the mean annual treatment dose (Defined Daily Doses (DDDs)), were compared yearly for 3 years.

Results:
In the matched treatment cohorts, 4% had filled prescriptions for hypnotics/sedatives during the year before treatment. At 1 year follow-up, following an average weight loss of 37kg and 18kg in the surgery and intensive lifestyle cohorts respectively, this proportion had increased to 7% in the surgery cohort but remained at 4% in the intensive lifestyle cohort (risk ratio 1.7, 95%CI 1.4-2.1), at 2 years 11% vs 5% (risk ratio 2.0, 95%CI 1.7-2.4), and at 3 years, 14% vs 6% (risk ratio 2.2, 95%CI 1.9-2.6). Among individuals with filled hypnotics/sedatives prescriptions prior to treatment, the mean annual treatment dose increased more in the surgery than the intensive lifestyle cohort (114 vs 67 DDDs during year 3; mean difference 57 DDDs; 95%CI 39-75).

Conclusions:
Gastric bypass surgery was associated with increased use of hypnotics/sedatives compared to intensive lifestyle modification. Use of sleep medications after gastric bypass surgery needs to be closely monitored.

Nutrition deficiencies after roux-en-Y gastric bypass (RYGB) in Hong Kong
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Background:
Bariatric surgery is rapidly developing in Asia in the last few years due to the increasing prevalence in obesity and diabetes. However, bariatric surgery patients are at risk for nutritional deficiency after surgery, namely protein, vitamin B12, D along with iron and calcium. Aim of this study is to evaluate the nutritional outcome in patients undergo Roux-en-Y gastric bypass (RYBG) in Hong Kong.

Methods:
Clinical data of patients undergo RYGB between 2013 and 2016 were collected retrospectively. All Patients were assessed by dietitians before and after surgery to ensure adequate nutrition intake both in macronutrients and micronutrients. Multivitamin, calcium and iron oral supplements are prescribed after surgery according to international guideline. Dietary protein intake are estimated during consultation and serum level of hemoglobin, albumin, iron, vitamin D and B12 are measured before and 12months after surgery.

Results:
Seventeen patients (7 female and 10 male) with mean age of 40.2±8.0 are included for analysis. Weight loss was observed in all patients postoperatively 12 months, with mean BMI dropped from 37.3±7.8 kg/m² to 27.8±9.8 kg/m² (p<0.05). Protein intake was significantly improved at post-operation 12 months (34.3±16.1 vs 55.7±13.7g, p <0.05). There were no significant change in plasma albumin, iron, total vitamin D and haemoglobin level. Serum vitamin B12 level is within normal range but it was significantly reduced (172.2±127.1 vs 78±41.2pmol/L, p < 0.05) despite oral supplement prescribed.

Conclusion:
Micronutrients need to be supplemented and monitored regularly in RYBP patients and parental supplement of Vitamin B12 may be necessary 12 months after surgery. Careful postsurgical monitoring and surveillance in a multidisciplinary approach can help avoiding the nutritional deficiencies problem.

Obesity and bariatric surgery in Oman - Another frontier with a different view. The royal hospital of Muscat experience.
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Background:
Global Obesity and metabolic diseases 's rising tides have affected significantly the shores of the Arabian Gulf and Oman. Obesity is seen in around 40% of females and 25% of males. The Metabolic syndrome prevails in around 25%. Bariatric services at the Royal Hospital, the biggest referral center in the country, started in 2012.

Objective:
To analyse the role of surgery in managing the disease and to emphasise the aspects of our practice that are unique to the setting of Oman.

Methods:
Descriptive retrospective study from a prospective data base of all Bariatric procedures done at the Royal Hospital between 2012 and end December 2016. Statistical analysis was done using SPSS16

Results:
237 cases of Sleeve Gastrectomy were done. 8 of these also had a Duodeno-jejunal bypass for Diabetes.
The average pre-op weight of 130kg and BMI of 47 came at 2 years follow up, to 82 kg and 30 respectively. Pre-op endoscopy was done in 223 (94% ). The incidence of H pylori in these was 92%. Simultaneous procedures were added in 62% including 24 (10%) Cholecystectomies and hiatal repairs 86(36% ).
There were no mortalities, no conversions, no anastomotic leaks, and no stenoses requiring intervention.
Diabetes was in 35% of the group for whom resolution was seen in 85% .
The unique challenges of setting the new service, including the infrastructure, peri-operative care, and follow up are discussed in comparison to other established programs.

Conclusions:
Obesity and its complications in the region, has become a demanding national health priority.
Unique indicators have been set in our protocols including pre-op endoscopy, allowance for simultaneous procedures and specific choice of metabolic techniques.
The results till date offer an encouraging trend with positive early results in both weight loss and improvement of the metabolic syndrome.


Facing the tides of diabetes in obesity – Early results of the role of surgery at the Royal Hospital in Muscat

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Background:
Oman on the Arabian Gulf, sits within an Obesity belt, high on the global ratings for the disease. Diabetes type II increased significantly over the past decade to a prevalence of around 20%. The WHO, anticipated an increase of 190% in the twenty years till 2025. Till recently and as in other countries, the offer of surgery to ameliorate this problem has been a distant notion.

Objective:
To offer a glimpse of the influence of surgery done on Diabetic Obese patients at the biggest centre in Oman and the unique challenges faced to establish this.

Methods:
Retrospective analysis from a prospective data base of all patients operated for Obesity with or without Diabetes at the Royal hospital in Muscat, between January 2012 and December 2016

Results:
Surgery for Obesity and/or its related complications was done in 237 patients. Of these, 84(35.4%) had either frank Diabetes 67(80 %) or Pre-Diabetes 17(20%).
The majority 76( 90.4%) had a Sleeve Gastrectomy (SG) alone, while 8(9.5%) underwent SG with Duodeno-jejunal bypass.
On follow up, preoperative mean FBS dropped from 8.1mmol to 5.0 while the HbA1c went from 9.5% to 5.7%. Alternatively, 84% and 70% stopped taking Oral hypoglycaemic and Insulin respectively. The surgical effect on the associated metabolic syndrome and lifestyle progress was also analysed.

Conclusion:
Surgery for Diabetes in Oman had an uphill challenge to establish itself, while backed by the growing global evidence to become part of the pathway of managing the disease.
Gastric sleeve remains the mainstay of practice, however If any ( more metabolic) bypass is to be done, it has to take in context the high prevalence of Gastric cancer in the region.
These early results are the first from Oman and are encouraging to expand this field of Metabolic surgery in Diabetes control.

1. Type 2 Diabetes in the Sultanate of Oman- Mal J Nutr., 17, 2011
The Trend & Impact of Maternal Overweight and Obesity on Obstetric Outcomes: Analysis from Nepean hospital.

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Objective:
To assess the prevalence, trend and impact of overweight and obesity on obstetric outcome in the area drained by Nepean hospital for the years 2005-2016.

Introduction:
Rates of overweight and obesity are continuing to rise in Australia. In 2014-15, 63.4% of Australians aged 18 years and over were overweight or obese (11.2 million people), comprised of 35.5% overweight (6.3 million people) and 27.9% obese (4.9 million people). In 2011-2012, 44% of Australian females aged 18-44 years were overweight or obese. The association between maternal obesity and adverse pregnancy outcomes is well recognized imposing a remarkable burden on feotomaternal health, this is a public health problem that stresses health resources.

Nepean hospital is the referral tertiary hospital for the Nepean Blue mountains local health district where all obese women (BMI >40) are referred for peripartum care.

Results:
From 2005 to 2015, pregnant mothers classified as normal weight decreased from 48 to 39%, while those classified as obese (BMI 30-40kg/m2) and morbidly obese (>40kg/m2) increased from 25 to 28% and 26 to 37%, respectively. In this cohort, compared to the general population, there was higher stillbirth rate (0.8 cf. 0.6%), hypertensive disorders (9 cf. 2-3%), diabetes (17 cf. 15%), caesarean sections (47 cf. 33%), post-partum haemorrhage (18 cf. 11%) and admissions to ICU (3.0 cf. 0.4%).

Consensus:
In our cohort there is alarming increase in the number of obese and morbidly obese pregnant women entering our service. This has been associated with more obstetric adverse outcomes. To date, this has stimulated the allocation of resources, community motivation and provision of new health services (OPAL) aiming to optimize feotomaternal health. More will need to be done at the community level to help address increasing rates of obesity in those of child-bearing potential.

Health Literacy – Is it a factor in influencing obesity management?

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Introduction:
The prevalence of obesity in Australia has been steadily increasing for the past 30 years. Recent literature suggests that health literacy impacts on health-related quality of life such that patients with low health literacy were more likely to be overweight and have poorer physical health. Delivery of high quality healthcare is often enhanced when patients have an adequate level of health literacy as it enables effective communication, participation and cooperation with health care professionals. The aims of this proof of concept study is to determine whether low health literacy plays a role in the management of obesity in general practice.

Methods:
A secondary thematic qualitative analysis of forty patient interviews that were undertaken for the purpose of examining the key barriers and enablers to the implementation of NHMRC obesity guideline recommendations in general practice were performed. An inductive thematic analysis method was used. These themes were guided by five key domains generated by the Calgary Charter on Health Literacy (CCHL) in 2013. These were: access, understanding, evaluation, communications and usage of health information.

Results:
Several themes emerged from our preliminary findings. In particular, the domains of ‘access’, ‘evaluation’ and ‘understanding’ were prevailing as dominant domains. Patients’ motivation improved with easier access to health professionals. Patients’ understanding about the effects of their obesity on their disease processes were generally varied, particularly on how they disease were being managed. The ability to self-evaluate their own obesity related disease suggest better control and management of their illnesses. These themes correspond to the domains identified by the CCHL.

Conclusion:
Health literacy is a complex concept but it is a vital determinant of health outcome. This proof of concept study highlighted the role of health literacy in the management of obesity in the general practice setting.

Profiling self-initiated weight loss attempts of obese western Australian children and adolescents
Investigating the role of executive functioning in the aetiology of excessive gestational weight gain: A prospective cohort study protocol

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Background:
Maternal obesity and excessive gestational weight gain have become one of the most common comorbid conditions of pregnancy. Developments in the related obesity literature have indicated that underlying differences in neural mechanisms related to executive functioning (EF) processes may play a role. These deficits may be further exacerbated in pregnancy, with up to 80% of pregnant women reporting some form of cognitive deficit in memory, attention, and/or EF. Therefore, the aims of this prospective cohort study are 1) to investigate whether pregnancy predicts changes in EF and 2) to explore whether these potential changes are associated with EGWG. Given the subtle nature of these cognitive processes, electroencephalography (EEG) and eye-tracking (ET) techniques will be used for this study.

Methods/design:
We report the design of a prospective cohort study of women planning to become pregnant in the next 1-12 months. Participation involves attendance at a cognitive behavioural task session (Session 1) and a neurocognitive EEG and ET session (Session 2) during the pre-pregnancy stage. Once pregnant, participants will be invited back to repeat testing Session 1 and 2 during the first trimester (typically 4-12 weeks’ gestation) and the third trimester (typically 27-38 weeks’ gestation). In addition, maternal demographic details and maternal weight will be serially measured during pregnancy. Data will be analysed as a prospective cohort study.

Discussion:
With this study, we hope to gain more insight into the relationship between pregnancy-related cognitive changes, and how these may influence the development of EGWG. This prospective longitudinal cohort design with a multi-method approach will lead to more knowledge about how pregnancy is linked to differences in cognitive processing as pregnancy develops, and how this may contribute to healthy weight of expectant women.
Program Goals:

- Assess, support and coordinate care for a patient who is targeting to improve their weight management.
- Screening for overeating and binge or other disordered eating and coordinate support and interventions.
- Patient Centered and Driven program moving at the pace of the patient and with patient consent and active engagement.
- Evidenced based and incorporates a multidiscipline approach with other health care providers in a close and integrative arrangement of care to support the patients goal for improvement in weight management.
- Patient outcomes are tracked and reviewed and measured to assist in critical analysis of the process and program and ensure that the patient is receiving high quality care which is evidenced based.
- Patient experience measurements will be used and these experiences will help improve the patient experience.

Program and the Process

Cost: Nurse Practitioner cost is Bulk billed under Medicare no limitations to consultations.

Pilot project for 18 months Federally Funded as part of an initiative to address Obesity.

Nurse Practitioner (Ph.D candidate)- Lifestyle Coaching Team Leader

Initial intake assessment is undertaken by a Nurse Practitioner who has specialised training in overweight and obesity management. During this assessment identification of barrier, needs, gaps are made and support organised around patient to engage in long term strategic approach to weight management. Follow up every 4-6 weeks with ongoing sessions and assessment with monitoring, education, support and depending on the patient needs identified, co-ordinations of other support professionals in the multidisciplinary team at patient engagement pace.

Program intake since Jan 2017 to date: 60 patients. Anticipate 100 patients

Ph.D intention: Patient Experience around weight management and health care provider engagements.

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An investigation of the neural correlates of inhibitory control and excessive gestational weight gain

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Background:

Excessive weight during pregnancy is experienced by almost 50% of all women, and is associated with negative health outcomes for both the mother and her child. Findings from several systematic reviews and empirical studies neural mechanisms related to executive functioning have found that obesity is associated with poorer inhibition decision-making skills (particularly in relation to food), higher levels of impulsivity, poorer and abnormal activation of brain regions crucial to self-regulation. The aim of the proposed research is to investigate the relationship between inhibitory control and excessive gestational weight gain (GWG) using a food flanker go/no-go task.

Method:

A pilot study of 27 pregnant women participated in the current study. Only women who gained within the recommended IOM guidelines (N=15 healthy GWG (HGWG)) and those who gained in excess of the IOM guidelines (N=9 excessive GWG (EGWG)) were included. The two groups were similar in age, parity, age of gestational weeks at testing.

Results:

The EGWG women exhibited lower response accuracy than the HGWG women for the Go task. However, for the no-go task HGWG exhibited disproportionately greater errors that the EGWG women. The EEG results indicated that the N2 differentiated inhibition between EGWG/HGWG rather than P3 with reduced N2 amplitudes for the HGWG only for food compared to the non-food stimuli.

Conclusions:

The N2 appeared to be the more sensitive of the two EEG components in detecting differences in processing between those who gain within and above the recommended guidelines. Findings suggested that the HGWG were inhibiting their response to food stimuli whereas the EGWG are not. As a decrease in no-go N2 amplitude is thought to reflect a reduction in conflict or early conflict processes the absence of this difference in processing for the EGWG may indicate that this is failing to occur in this group.

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Parents’ attitudes and beliefs: a new avenue to reduce provision of unhealthy foods to children

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Parents’ attitudes and beliefs influencing food provision provide a promising new avenue for obesity prevention through reducing children’s intake of unhealthy foods and beverages. There is a need to understand the relative importance of different parental attitudes and beliefs in influencing their provision, hence this study aimed to explore the relationships between parents’ attitudes and beliefs, and parents’ intention and children’s intake of unhealthy foods. Parents (n=162) with children aged 4-7 years, completed an online self-reported questionnaire providing data on parents’ attitudes and beliefs (predictor variables) based on the Health Action Process Approach (HAPA) model, child and parent demographics and potential confounders. The HAPA model, based on socio-cognitive theory, consists of 2 phases (motivational and volitional) and includes constructs of risk perception, outcome expectancies, self-efficacy and planning for behaviour change. Multiple linear regression analyses, adjusting for all other predictors and confounders, were conducted on the HAPA motivational phase (outcome variable parent’s intention) and volitional phase (outcome variable children’s intake of unhealthy foods). In the motivational phase, parents’ action self-efficacy ($\beta = 0.319$, $p<0.05$) and risk perception for their child ($\beta = 0.185$, $p<0.05$) had the strongest association with parents’ intention to limit provision of unhealthy foods. In the volitional phase, parents’ maintenance self-efficacy ($\beta = -0.297$, $p<0.05$) had the strongest association with children’s intake of unhealthy foods. Motivation or intention alone are unlikely to achieve change in parental food provision behaviour. The application of the HAPA theoretical framework may explain the disparity between parents’ unhealthy food provision intentions and behaviours. Initial exploration of parents’ attitudes and beliefs highlight self-efficacy as an important target for interventions to support parents’ to change provision behaviour. Further research is needed using HAPA model to develop evidence-based interventions to support parents’ to limit provision of unhealthy foods, hence improve energy balance and prevent obesity from an early age.

**Who discusses reaching a healthy weight with their general practitioner?**

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**Introduction:**

Obesity is associated with increased risk of morbidity and mortality. Primary health care providers can positively impact on patient behaviour change and weight management, and clinical practice guidelines recommend that general practitioners (GPs) promote and provide advice to patients about the benefits of a healthy lifestyle, including weight management; however, concerns about damaging the patient relationship can make it difficult for GPs to raise the topic of weight and obesity. The aim of this study was to investigate the characteristics of Australians who report talking to a GP about their weight.

**Method:**

Nationally representative data from the 2014–15 National Health Survey were used to estimate the numbers and characteristics of Australians aged 15 years and over who have discussed reaching a healthy weight with their GP.

**Results:**

Of the sample of 18,954 respondents, we showed that 30.3% (95% confidence interval (CI) 28.7 – 31.9) of people estimated to be obese (BMI≥30 kg/m2) reported discussing reaching a healthy weight with a GP in the previous 12 months. Of those, higher proportions of people with poor or fair self-rated health, people with moderate-to-high levels of psychological distress, and those with hypertension, diabetes, or more self-reported comorbidities, reported discussing weight with a GP in the previous 12 months. The higher the number of reported GP visits in the previous year, the higher the proportion of people with obesity who talked about their weight.

**Conclusion:**

Our results help to identify parts of the population who may not be discussing reaching a healthy weight with their GP. The findings raise awareness for primary care providers about specific patient groups who might benefit from targeted strategies. In particular, our findings highlight the opportunity for earlier intervention, by initiating discussions with patients about their weight before the patient develops comorbidities, and other weight-related health issues.

**Associations between multiple lifestyle factors with overweight and obesity among Malaysian adolescents**

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In light of rapid rise in childhood obesity, there is a growing concern on the onset of multiple lifestyle behaviours during adolescence, a stage where establishment of lifelong health behaviours affects future health in adulthood. A cross-sectional study was conducted in two randomly selected government secondary schools in Selangor, Malaysia to determine multiple lifestyle factors associated with overweight and obesity among adolescents aged 13 to 16 years. A total of 513 adolescents (41% males and 59% females) with a mean age of 14.0±1.3 years participated in this study. They answered a self-administered questionnaire on socio-demographic background, eating behaviours, meal consumption pattern, physical activity and sleep quality. Weight, height and blood pressure were measured, while physical fitness was assessed using the modified Harvard step-test. Results showed that the prevalence of overweight and obesity was 33%, while prehypertension and hypertension rate were 19% and 12%, respectively. Unhealthy behaviours were prevalent in adolescents, in which 86.4% skipped at least one meal daily, 38.8% had low physical activity level, 63.9% had low physical fitness level, and 72.5% had poor sleep quality. After...
Unfolding the ‘Staple Saboteur’ to allow easier and safer stapling of the antrum

Suzanne Ma, Ken Loi

As widely recognised already, the antrum is the thickest area of the stomach encountered upon gastric stapling. The average thickness of the antral wall is 5 +/-1mm but the range is great as 1-18mm in healthy normal tissue.

Due to this fact, upon performing a laparoscopic gastric sleeve, some opt to; forego buttressing, use a greater staple height or minimise antral stapling all together.

A posterior pre-pyloric pleat or the staple saboteur (as we call it) has been identified at the routine dissection of the omental from the antrum.

By unfolding this pleat prior to stapling, the antrum becomes immediately visibly less thick allowing for easier and therefore theoretically safer stapling of this area.

Videos provided.

Laparoscopic conversion of Single Loop Bypass to a Roux Loop - Video Presentation

Lash Wickramasuriya¹, George Hopkins¹ ²

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Purpose:
Single loop gastric bypass (SLGB) is an alternative procedure to the Roux-en-Y gastric bypass (RYGB); the latter being the gold standard approach for surgical management of morbid obesity in Australia. Concerns exist regarding possible long-term complications from SLGB specifically related to bile acid reflux and associated oesophagitis and marginal ulcer formation.(1-5)

Our group has now performed SLGB as both a primary procedure and as a revisional procedure for gastric banding for three years. A number of these have had to be converted to a roux loop. We would like to present the outcomes of twelve cases explaining the indication for conversion to Roux and in some cases refashioning of the gastrojejunostomy; providing an intraoperative video example of this.

Methods:
From September 2015 to April 2017, twelve patients underwent laparoscopic revision of their SLGB to a roux limb performed via a 5-port technique. Three of the cases required resection and then refashioning of the gastro-jejunostomy along with formation of a new jejuno-jejunostomy. In the remaining nine, the biliary limb was detached from the gastro-jejunostomy and re-inserted as a new roux limb 50cm distally.

Results:
Indication for roux-limb was bile-reflux in 58% of the cases. Median time from SLGB to revisional RYGB was 6.5 months. All patients recovered well with good resolution of their prior symptoms. One case had a complication from surgery necessitating re-operation for reduction of internal hernia. Two others required subsequent laparoscopic division of adhesions for pain.

Conclusion:
It imperative that with the growing popularity of the SLGB procedure, bariatric surgeons can successfully perform revisional roux-loop surgery if complications arise. We present 12 cases with good results of symptom resolution and a video outlining one successful case that required refashioning of the gastro-jejunostomy. We will discuss the evolution of this technique and limitations of this emerging issue.

Secondary level care of paediatric obesity: A pragmatic implementation study

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Background:
In New South Wales (NSW), Australia, one in four school-aged children and adolescents are overweight or have obesity. Despite this prevalence, weight issues are rarely recognised or managed when patients attend clinical services and there are few appropriate clinical services available.

Methods:
Several Local Health Districts (LHDs) are implementing a new service aiming to deliver integrated weight management services for children and adolescents. This presents a unique opportunity to research the implementation and integration of these new services alongside established services to determine the clinical effectiveness and impact of the services. No such research has been undertaken previously in Australia. A submission was made through the Translational Research Grant Scheme, NSW, which has been successful and funding has been secured for a two year period from July 2017 to June 2019.

The study aims to evaluate existing services, and then to design, test, evaluate and integrate new services as they are established. We plan to:

1. Audit existing tertiary and secondary care models for managing children above a healthy weight.
2. Evaluate the newly established secondary care clinics, models of care and healthcare pathways.
3. Determine what factors, including acceptability, reach, participation and retention rates, effectiveness and sustainability, are important for different models of care through focus groups and stakeholder interviews.
4. Undertake economic analysis to determine cost of services.

Outcomes:
The findings will feed directly into the NSW Premier’s Priority work on “Tackling Childhood Obesity” and improve the design and delivery of local services, enhancing the accessibility, acceptability, reach and impact of services for children and adolescents above a healthy weight.

Delivering fully integrated tertiary care to severely obese children - An early outcome study

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'Danny's Place' is a South Australian institute established specifically for provision of integrated obesity services to severely obese children between the ages of 10-18 years. Diet and behaviour/lifestyle modification is in the form of a six month 'Be Your Best' (BYB) programme which is also compulsory for all patients referred for bariatric surgery. The aim of this study is to report the early experience of 'Danny's Place' in provision of tertiary level care for childhood obesity.

Materials and methods:
All 34 children (aged 9.5-17.8yrs, 20 females) presenting to Danny’s Place between 01/03/2016 and 30/05/2017 for weight management were included in the study, and grouped as below:

1. Adolescents referred for bariatric surgery (n=5)
2. Children who chose to enter the BYB programme(16).
3. Children seen on more than one occasion for dietary advice but did not undergo the BYB programme. (n=13)

prospectively collected data (demographic, anthropometric, body composition, clinical and laboratory) was analysed.

Results:
The mean (± SD) BMI centile for the three groups of children (bariatric, BYB, non BYB) was 99.33 (±0.29), 98.63(±1.63) and 97.63 (±2.64) respectively. The mean (± SD) BMI z score for the same three groups was 2.81 (±0.33), 2.42 (±0.43) and 2.16 (±0.47) respectively.
3/5 adolescents in group 1 have successfully undergone (lap band surgery (n=1), or sleeve gastrectomy (n=2); (current mean BMI loss= 10.5)
1/16 in group 2 has so far failed to engage with the BYB programme. Four other patients in group 2 have not shown satisfactory weight loss (±1 BMI unit). The mean(± SD) BMI loss in the remaining 7/16 patients who have completed 6 months of the BYB programme is 2.93 ((± 1.6).

Conclusions:
This early data suggests that integrated tertiary level services for childhood obesity can be effectively provided at a community level.

### Foot pain severity is associated with the ratio of visceral to subcutaneous fat mass, fat mass index and depression in women

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Introduction:
Body composition and poor mental health are risk factors for developing foot pain, but the role of different fat deposits and psychological features related to chronic pain are not well understood. The aim of this study was to investigate the association between body composition, psychological health, and foot pain.

Method:
Eighty-eight women participated in this study: 44 with chronic, disabling foot pain (mean (standard deviation) age 55.3 (7.0) years, body mass index (BMI) 29.5 (6.7) kg/m²), and 44 age and BMI matched controls. Disabling foot pain was determined from the functional limitation domain of the Manchester Foot Pain and Disability Index. Body composition was measured using dual x-ray absorptiometry, psychological health (catastrophisation, central sensitisation, and depression) was measured using three validated questionnaires.

Results:
Between-group analyses found that foot pain was not significantly associated with body composition variables, but was significantly associated with all psychological health measures (P < 0.001 - 0.047). Within-group analyses found that the severity of foot pain was significantly correlated with body composition measures: fat mass (total, android, gynoid, visceral), fat mass ratios (visceral/subcutaneous (VAT / SAT), visceral / android), fat mass index (FMI), and depression. In multivariable analysis, VAT / SAT (β 1.27, 95% confidence interval (CI) 0.28 - 2.27), FMI (β 0.14, 95% CI 0.02 - 0.25) and depression (β 0.06, 95% CI 0.00 - 0.12) were independently associated with foot pain severity.

Conclusions:
Psychological health, but not body composition, was associated with prevalent foot pain. For women with foot pain, VAT / SAT, FMI, and depression were associated with severity. Further work is needed to determine if a reduction in fat mass reduces the severity of foot pain.

### How reliable are fat utilisation assumptions for individualised clinical care?

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Background:
Obesity is a disease of fat storage and reduced fasting fat utilization, commonly assessed from Respiratory Quotient (RQ) using Indirect Calorimetry (IC), impacts weight, weight regain and health (1). Measurement of RQ could provide a basis for individualised nutritional intervention and successful obesity management. However the cost and complexity of present day technology precludes its widespread use in the clinical setting (2).

Objectives:
To assess the value of RQ measurement in the clinical setting, we investigated how different the fasting RQ (and fat utilisation) of 282 overweight and obese adults attending a primary care clinic in Western Australia, compared to normative data indicating an RQ of 0.81 corresponding to a fuel utilization ratio of >62% Fat and >38% CHO (3).

Material and Methods:
We conducted a retrospective analysis of metabolic data measured using ECAL, an Indirect Calorimeter (IC) (ETSA, Australia) (4). Respiratory Exchange Ratio (RER) was measured during testing, and is equivalent to RQ and fuel utilization at a cellular level (5). Subjects were instructed to observe a shortened 4 hour fasting protocol developed for clinical practice (6).

Results:
171 (60.6%) of subjects recorded sub-optimal fat utilization defined as having RQ > 0.81 (3). Six subjects who have fasted for 8-10 hrs have been excluded. For the 4-8 hr fasted subjects, 93 (56.4%) have an RQ > 0.81. For the >10 hr fasted subjects, 74 (66.7%) have an RQ > 0.81. Overall, more than half of the subjects exhibited sub-optimal fat utilization whether they have fasted 4-8 hrs or >10 hrs, suggesting the importance of RQ and IC for the clinical management of the overweight and obese.

Conclusion:
The results suggest that assumptions of fat utilisation have limited value for obese and overweight individuals and highlight the need for measurement of RQ to individualize obesity management.

4. (4) ECAL Product Brochure. Energy Testing Solutions Australia Pty Ltd.

Role of yoga and meditation in weight management and mindful eating
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Introduction:
Eating is natural healthy and pleasurable activity of satisfying hunger. Non hunger triggers of eating, inactivity play a major role in weight gain and obesity. Behavioral modification and mindful eating with practice of yoga and meditation have shown desirable results in managing weight.

Methodology:
520 Women between the age group of 30 to 67 years were observed over a period of 3 years. Out of 520 participants, 230 were given a structured pattern of yogic practice for 1 hour 5 minutes 6 days a week. 290 participants were on exercise pattern. Out of 230 participants 15 were not regular. Detailed medical and diet history of the participants was taken.

Initially weight, BMI, fat %, waist circumference , FBS , PPBS , HBA1c, Lipids levels and blood pressure were noted and compared at the end of the program. Similarly simple physical fitness evaluation was conducted, for flexibility – trunk flexion and trunk extension, for musculo-skeletal endurance sit ups and pushups, for cardiovascular endurance step test with 12" high table.

Conclusion:
Since Yoga helps reduce stress and anxiety, it may decrease eating triggered by these emotions. Gradually diminishes sympathetic dominance resulting in more balanced equilibrium between sympathetic and para sympathetic responses. Yogic practice helps in mindful eating, slows and prevents weight cycling as compared to people on normal exercise pattern. Most suited life style with elderly age group.

Quantifying the role of modifiable risk factors in the differences in cardiovascular disease mortality rates between metropolitan and rural populations in Australia
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Background:
Rural Australians experience higher mortality from cardiovascular disease (CVD), and especially from ischaemic heart disease (IHD), when compared to metropolitan counterparts. CVD risk factors are known to differ by rurality but little is known about how these differences contribute to the increased rural CVD and IHD burden. Aims: (1) to quantify differences in modifiable risk factors between urban and rural populations, and (2) to determine the number of rural CVD and IHD deaths that could be averted or delayed if risk factor levels in rural areas were equivalent to metropolitan areas.

Design:
A macro-simulation modelling study.

Methods:
National population estimates, risk factor prevalence, CVD and IHD deaths data were analysed by rurality using the Preventable Risk Integrated Model (PRIME) macro-simulation chronic disease risk model. Uncertainty analysis was conducted using a Monte Carlo simulation of 10,000 iterations to calculate 95% credible intervals (CI).

Results:
If people living in rural Australia had the same levels of risk factors as those in metropolitan areas, approximately 1458 (95% credible interval (CI): 1088, 1803) deaths could be delayed from cardiovascular disease (CVD) annually. Of these CVD deaths, 793 (95%CI: 506, 1065) would be from IHD. The IHD mortality gap between metropolitan and rural populations would be reduced by 38.2% (95%CI: 24.4%, 50.6%).
Conclusions:
A significant portion of deaths from CVD and IHD could be averted with improvements in risk factors; more than one third of the excess IHD deaths in rural Australia were attributed to differences in risk factors. As much as two thirds of the increased IHD mortality rate in rural areas could not be accounted for by modifiable risk factors, however, and this requires further investigation.

FSANZ Claims and Health Star Ratings: A label audit of ready-to-drink sugary beverages

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Background:
Australia have codes of practice for the labelling of food and beverages that aim to guide consumers in the choices they make. One example is the Australian New Zealand Food Standards Code on Nutrition, Health and Related Claims that regulate the use of health and nutrition claims. Another example is the voluntary Health Star Rating system that provides an interpretative front-of-pack scheme indicating which products among categories are the least and most healthy options. As these codes aim to assist healthy choices, it is important to know how they appear on unhealthy food and beverages. The objective of this study was to measure the presence of health and nutrition claims and health star ratings on ready-to-drink beverages containing sugar.

Methods:
We conducted a label audit of 631 ready-to-drink (≤600ml) sugary beverage labels during September to November 2016 in 17 South Australian supermarkets. We recorded the presence of a star rating in accordance with the Health Star Rating system and Health and Nutrient Content Claims in accordance with the Australia New Zealand Food Standards Code on Nutrition, Health and Related claims. The sugar content of beverages was also recorded.

Findings:
Health Claims were present on 5.1% of ready-to-drink sugary beverages and Nutrient Content Claims were present on 58.0%. Beverages using Nutrient Content Claims were often high in sugar. Health Star Ratings were present on 7.8% of ready-to-drink sugary beverages (n=49) with the majority displaying a 5 star rating (the highest rating score). Of those with a Health Star Rating (n=49), almost all were 100% juices (n=45) which contained a large amount of free sugar.

Conclusion:
The high use of Nutrient Content Claims and Health Star Ratings position certain beverages, particularly juices, as healthy options despite their high sugar content.

Demographic correlates of parental consumption of sugary drinks in a National Australian study

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Introduction:
Excess consumption of sugary drinks has been identified as a significant contributor to excess energy intake, weight gain and obesity. Parental consumption of sugary drinks are of interest due to the potential parental influence on children’s consumption through modelling dietary behaviour and provision of sugary drinks to their children.

Methods:
Data collection was recently completed for a national cross-sectional survey of ~3,400 Australian respondents (18 years and older), conducted utilising Computer Assisted Telephone Interviews to examine prevalence and patterns of sugary drink consumption. Data from ~1,000 parents with at least one child aged 0-18 years, will be analysed in a sub-study to determine predictors (e.g., gender, age, and socio-economic status) of sugary drink consumption among parents.

Results:
Preliminary unadjusted results indicate that the overall rate of sugary drink consumption was similar in parents and non-parents. However, parents were more likely than non-parents to consume some specific beverages (soft drink and fruit juice),
and have these available in the home. Overall, there were similar significant unadjusted associations observed between gender, age, SES and level of education with level of consumption of sugary drinks (no consumption vs 1-6 drinks per week vs 7+ drinks per week). However, younger parents (18-34 years), parents resident in a low SES area and parents with a lower level of education were observed to have greater levels of consumption of sugary drinks than non-parent comparative demographic groups. Parents with at least one child aged 0-4 years had greater levels of consumption of sugary drinks than those with older children.

Conclusion:

Understanding sugary drinks patterns in parents help to contextualise the environments in which sugary drinks are consumed. This study will assist our appreciation of the factors related to parental consumption, and will inform the development of future studies and interventions aimed at reducing consumption.

### Associations between behavioral factors and body weight status: Comparison between Chinese vegetarians and non-vegetarians in Malaysia

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An increasing trend of individuals practicing vegetarianism has been observed in the world. Little is known about obesity and its associated factors among vegetarians in Malaysia. Hence, this cross-sectional study aimed to compare the associations between behavioral factors (physical activity level, dietary intake, smoking behavior and body image perception) and body weight status between Chinese vegetarians and non-vegetarians. A total of 271 vegetarians (56.8% females and 43.2% males) with a mean age of 38.4 years (SD=11.4) and 278 non-vegetarians (62.2% females and 37.8% males) with a mean age of 34.1 years (SD=13.4) from a Buddhist society in Malaysia participated in this study. Respondents completed a self-administered questionnaire on socio-demographic background, physical activity level, smoking behavior and body image perception. Their height, weight, body fat percentage and waist circumference were measured and dietary intake was assessed using a 24-hour dietary recall. Results showed that vegetarians were older and had higher educational level than non-vegetarians. More vegetarians were underweight, non-smokers, had high body fat percentage, low percentage of abdominal obesity, high physical activity level, and desired to have a bigger body size as compared to non-vegetarians. In terms of nutrient intake, vegetarians showed significantly lower intakes of energy, protein, fat, vitamin B12 and sodium but higher intakes of folate and calcium as compared to non-vegetarians. Vegetarians who were older (OR=1.036, p=0.027), had low energy intake (OR=0.997, p=0.004), high carbohydrate intake (OR=1.017, p=0.005), and high body dissatisfaction (OR=1.689, p=0.001) were more likely to be overweight/obese. For non-vegetarians, those who were older (OR=1.049, p=0.001) and had high body dissatisfaction (OR=1.805, p<0.001) were more likely to be overweight/obese. Age and body dissatisfaction predicted the problem of overweight and obesity in both vegetarians and non-vegetarians. Nutrition intervention programs on weight management among vegetarians and non-vegetarians should include body image component.

### Consumer perceptions of free sugar in yoghurt and industry trends

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All types of yoghurt are considered a five food group food. Research shows yoghurt is associated with the least weight gain in the long term, however flavoured varieties are often considered unhealthy. These concerns are partly driven by the perceived high free sugar content. The 2011-2012 Australian Health Survey showed consumption is currently low; only 16% consumed yoghurt on the day of the survey with a median intake of 123g, less than the 200g recommended serve. Three-quarters (76%) of the yoghurt consumed was flavoured.

The aim was to explore industry sales trends and consumer perceptions related to yoghurt from recent years. Retail sales data was collected between 2014/2016. Two quantitative surveys of Australian adults were conducted in the same period (April 2014, n=1,635 and April 2016, n=1,621) to assess whether consumers agreed with the statement ‘there is too much sugar in flavoured yoghurt’. Weighting ensured gender and age representativeness.

Industry data showed a 1.4% decline in total yoghurt sales between 2014/16. Sales of flavoured yoghurts decreased by 9.6%, while natural varieties increased by 12.3%. The percentage of those who agreed with the statement ‘there is too much sugar in yoghurt’ significantly increased between 2014/16 (50% versus 61%, P<0.05).

Recent data shows consumers are shifting away from flavoured varieties, more toward natural varieties, however total yoghurt sales are declining. Despite yoghurt contributing only 1.5% to the total free sugar content of the diet, Australians may be limiting a nutritious food because of increased concerns around single nutrients like sugar. Current research has shown consumers tend to sweeten natural yoghurt, however this is not always the best solution as people tend to add more sugar when compared to pre-sweetened varieties. Given the current under consumption of the dairy food group, all types of yoghurts are foods to be encouraged, not discouraged.

### Soju drinking related central fat accumulation

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Soju drinking related central fat accumulation among vegetarians and non-vegetarians in Malaysia. A total of 271 vegetarians (56.8% females and 43.2% males) with a mean age of 38.4 years (SD=11.4) and 278 non-vegetarians (62.2% females and 37.8% males) with a mean age of 34.1 years (SD=13.4) from a Buddhist society in Malaysia participated in this study. Respondents completed a self-administered questionnaire on socio-demographic background, physical activity level, smoking behavior and body image perception. Their height, weight, body fat percentage and waist circumference were measured and dietary intake was assessed using a 24-hour dietary recall. Results showed that vegetarians were older and had higher educational level than non-vegetarians. More vegetarians were underweight, non-smokers, had high body fat percentage, low percentage of abdominal obesity, high physical activity level, and desired to have a bigger body size as compared to non-vegetarians. In terms of nutrient intake, vegetarians showed significantly lower intakes of energy, protein, fat, vitamin B12 and sodium but higher intakes of folate and calcium as compared to non-vegetarians. Vegetarians who were older (OR=1.036, p=0.027), had low energy intake (OR=0.997, p=0.004), high carbohydrate intake (OR=1.017, p=0.005), and high body dissatisfaction (OR=1.689, p=0.001) were more likely to be overweight/obese. For non-vegetarians, those who were older (OR=1.049, p=0.001) and had high body dissatisfaction (OR=1.805, p<0.001) were more likely to be overweight/obese. Age and body dissatisfaction predicted the problem of overweight and obesity in both vegetarians and non-vegetarians. Nutrition intervention programs on weight management among vegetarians and non-vegetarians should include body image component.
Metabolic syndrome in polycystic ovary syndrome: a systematic review and meta-analysis

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Introduction:
Both polycystic ovary syndrome (PCOS) and the metabolic syndrome (MS) are associated with increased long-term risk of type 2 diabetes and cardiovascular diseases in association with aetiological factors including obesity and insulin resistance. However, the prevalence of MS in PCOS varies widely and the contribution of socio-demographic or biological factors to this variability is not known.

Methods:
A literature search was conducted in MEDLINE, CINAHL, EMBASE and clinical trial registries to identify studies reporting prevalence of MS in women with or without PCOS. Data were presented as odds ratio (OR [95% confidence interval (CI)]) with random-effects meta-analysis by Mantel-Haenszel methods. Subgroup analyses and meta-regression were conducted for variables including age, BMI, geographical and income regions, insulin and androgens.

Results:
A total of 4530 articles were reviewed and 34 were included for the systematic review and meta-analysis comprising 21310 women. Women with PCOS had an increased prevalence of MS (OR 2.39, 95% CI 1.81, 3.15; BMI-matched studies OR 2.45, 95% CI 1.37, 4.36). Women with PCOS in Americas (OR 4.19, 95% CI 1.30, 13.50) and English-speaking countries (OR 3.58, 95% CI 2.75, 4.66) had significantly greater risk of MS compared to other regions (P<0.01 for subgroup differences). Adolescents with PCOS (OR 4.87, 95% CI 3.17, 7.49) also had greater risk of MS than adults (OR 1.48, 95% CI 1.11, 1.96) with PCOS compared with controls (P<0.0001 for subgroup differences).

Conclusion:
Women with PCOS have increased risk of MS in both BMI-matched and non BMI-matched studies. Studies in Americas countries, English-speaking countries and adolescents reported further increased risk of MS. Further studies are required to explore the reasons for these differences.
Australia has one of the highest levels of obesity amongst OECD countries. Bariatric surgery is the most effective therapy for long-term weight loss amongst persons with morbid obesity. However, weight loss is a highly variable outcome due to a range of factors, including comorbidity, socioeconomic status, and genetic makeup. Common allele homozygotes for FTO rs9939609 have been found to be associated with more consistent weight loss over the long term post-bariatric surgery. This study will examine the cost-effectiveness of genetic screening for FTO compared to no screening in patients with morbid obesity.

A microsimulation model, NCDMod, will be used for an economic evaluation. We will compare both health outcomes and costs for Scenario 1 where bariatric surgery was offered to those aged 20-64 with BMI>40 and Scenario 2 which offered bariatric surgery to those aged 20-64 with BMI>40 but testing positive to FTO. Key health outcomes were the reduced number of persons with obesity, diabetes diagnoses, shifts in healthcare costs between 2015 and 2025; and the ICER of cost per obesity case averted.

Approximately 20,000 persons amongst the 320,000 eligible were simulated to undergo bariatric surgery under each scenario. The genetic screening group (Scenario 2) had 11,000 less persons with obesity in the cohort 10 years post-surgery than the no screening group. Further, the genetically screened group experienced 300 less CVD events across 10 years post-surgery and had similar levels of diagnosed diabetes. The healthcare costs per person per annum was $650 less for the screened group. Genetic screening of eligible patients for bariatric surgery dominated no screening because its effectiveness was higher and its costs lower.

In the move to personalised medicine, this study shows that genetic screening in patients with morbid obesity may assist in patient/clinician decision making regarding bariatric surgery.

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**Community obesity prevention networks at baseline: a social network perspective**

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**Introduction:** Community-based obesity prevention efforts are dependent on the strength and function of collaborative networks across multiple community systems. There is little empirical work on understanding how community network structure influences obesity prevention capacity. We describe network structures within nineteen local government communities prior to a large-scale community based obesity prevention intervention, Healthy Together Victoria, Australia (2012-2015).

**Methods:** Participants were from a large, multi-site, cluster randomized trial (cRCT) of a whole of systems chronic disease prevention initiative. Community leaders from twelve prevention and seven comparison regions identified and described their professional networks in relation to dietary, physical activity and weight gain issues in young children (<5 years of age) within their community. Social network measures of density, modularity, clustering and centrality were calculated for each community. Comparison of means and tests of association were conducted for each network relationship.

**Results:** One-hundred and seven respondents (78 intervention; 29 comparison) reported on 1,000 professional network relationships (respondent average: 10 intervention; 8 comparison). Networks were typically sparse, highly modular, heterogeneous in size and relationship composition. Frequency of interaction, close and influential relationships were inversely associated with network density.

**Discussion and Conclusion:** At baseline in this cRCT there were no significant differences in network structures related to key actors with remit to influence environments affecting dietary, physical activity and weight gain decisions of children. Tracking heterogeneity in both networks and measured outcomes over time may help explain the interaction between these two vital aspects of community based intervention.

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**The relationship between weight change and daytime sleepiness: The Sleep Heart Health Study**

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**Background:** Obesity is associated with excessive daytime sleepiness, but causality remains unclear. Through a causal framework, we aim to assess the effect of weight change on daytime sleepiness, and the role of obstructive sleep apnea (OSA) in this relationship.

**Methods:** From the Sleep Heart Health Study, we selected individuals who were: 1) 40 to 64 years old, with 2) body mass index (BMI) ≥18.5 kg/m², 3) no history of stroke, treatment for OSA, and tracheostomy at baseline. We used multiple linear regression to assess the relationship between 5-year weight change and daytime sleepiness (assessed through Epworth Sleepiness Scale (ESS)) at 5 years, adjusting for potential confounders, in those with complete data (n=1,468). Potential confounders were...
Sugar Sweetened Beverage (ssb) consumption in Australian aboriginal and Torres strait islander communities: A systematic scoping review

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Introduction:
Rates of diabetes, obesity, and associated chronic diseases are known to be high in Aboriginal and Torres Strait Islander populations, and diabetes has been highlighted by communities as a priority for future research. Within the literature, sugar-sweetened beverage (SSB) consumption has been singled out as a modifiable risk factor for both obesity and diabetes. Therefore, to inform future interventions, a systematic scoping review of SSB consumption was planned. The aims of the study were to map consumption prevalence, correlates of consumption, and describe interventions that have aimed to reduce SSB consumption in Aboriginal and Torres Strait Islander populations.

Methods:
Major databases and grey literature were searched and reference lists were scanned. The NHMRC’s definition of added-sugar drinks was adopted: sugar-sweetened soft drinks and cordials, fruit drinks, vitamin waters, energy and/or sports drinks. English language studies were included if they contained data regarding SSB consumption, correlates, or an intervention aiming to reduce SSB consumption.

Results:
A total of 2022 records (title or abstract) were screened for eligibility. 198 full-text records were retrieved, and 47 met eligibility criteria. Preliminary results found that SSB consumption is high in both rural and urban populations. Interventions to reduce SSB consumption include health education, and remote community-driven initiatives such as changes to availability and pricing of SSBs in community-owned stores. Data for specific sub-populations is fragmented across studies with heterogeneous methodologies.

Conclusion:
This systematic scoping review will bring together a previously fragmented literature for SSB consumption, correlates, and intervention-reduction interventions for Aboriginal and Torres Strait Islander communities. The results are likely to be of interest to communities, researchers and policy makers aiming to reduce chronic diseases associated with SSB consumption.

Factors perceived to influence healthy eating: A systematic review and meta-ethnographic synthesis of the evidence.

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An unhealthy diet is the leading risk factor for the growing, global burdens of obesity and non-communicable disease, which disproportionately affects individuals in lower socioeconomic positions. As we attempt to understand the ‘causes of the causes’, that drive unhealthy eating, naturalistic and in-depth qualitative inquiry is required to ‘give voice’ to every day citizens by exploring their perspectives and life experiences. Whilst multiple studies have attempted to achieve this, to date there has been no collective synthesis or analysis of these studies. This is essential to advance our understanding and guide the identification and implementation of effective interventions to improve population diets. This study aims to systematically review the literature to identify factors perceived to influence healthy eating among adults and whether these differ across the socioeconomic gradient. The review protocol has been registered in PROSPERO (CRD42017065243).

Conclusions:
Weight gain has a detrimental effect on daytime sleepiness, mostly through pathways other than OSA. This study provides further evidence and understanding to the relationship between obesity and excessive daytime sleepiness, which may help in the management of obesity-related EDS.
Relevant qualitative studies were searched for in four academic databases which retrieved a total of 9,895 records. Grey literature and reference list searches were also conducted and 33 eligible studies were identified. The studies represented a combined sample of 1451 adults with 76% in community settings, 48% in the United States and over one third in low socioeconomic groups. Interpretive analysis of the qualitative findings is being conducted according to the seven steps of meta-ethnographic synthesis, described by Noblit and Hare (1988). Preliminary findings indicate that cost is the most frequently reported barrier to healthy eating (85% of studies), with all studies targeted at low socioeconomic participants alluding to this theme. Perceptions regarding social environments, knowledge and skills, time constraints, effort, health and food availability were also common factors influencing healthful eating. These findings will enhance our knowledge of where and how to intervene to improve population diets and reduce the burden of obesity and non-communicable disease across all socioeconomic groups.