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Health Benefits of Intermittent and Periodic Energy Restriction

The Sydney Boulevard Hotel

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Sydney NSW 2011

Australia



WORLD OBESITY

Dear Colleagues,

We are delighted to welcome you to Sydney for the 14th World Obesity Stock Conference.

This year's conference focuses on the Health Benefits of Intermittent and Periodic Energy Restriction – a topic that has attracted people from multiple disciplines to the conference, including basic and clinical researchers, clinicians and industry representatives. The robust interest in this conference is an indication of the extent to which intermittent and periodic energy restriction are seen as potential avenues for the improvement of human health – not only via reductions in overweight/obesity, but also for improving the function of multiple organs and systems, including glucose homeostasis, tumour suppression and the maintenance of cognitive function.

We encourage and expect you to avidly engage in discussion over the ensuring two days, ideally using plain language to maximise cross-fertilisation of ideas from different disciplines. World Obesity Stock Conferences are unique in that they encourage a strong focus on discussion, facilitated by the small size of the conference, and the ample discussion time allocated after each invited speaker's talk and in morning and afternoon tea breaks and lunch. Additionally, this year we have introduced 'Short Talks' from a number of participants, thereby further facilitating discussions.

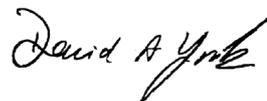
The last session of this conference is designated for brainstorming on recommendations for the field moving forwards. For example, identifying how existing knowledge can be applied to clinical practice now, and pinpointing the most pressing gaps in current knowledge for future research.

We look forward to your contributions to our discussions over the coming two days which will help to ensure the success of this conference, and trust you will also find opportunities to explore some of Sydney's unique attributes after the conference.

Sincerely,



Amanda Salis PhD, The University of Sydney
Scientific Co-Chair, World Obesity Stock Conference 2017



David A York PhD, Wayne State School of Medicine
Convenor, World Obesity Stock Conferences



Valter D Longo PhD, University of Southern California
Scientific Co-chair, World Obesity Stock Conference 2017

CONTENTS

Conference Schedule	4
Exhibitors	6
Speaker Abstracts	7
Speaker Biographies	11
Submitted Abstracts	13
Attendee Biographies	20

CONFERENCE SCHEDULE

Friday 31st March 2017

	Start Time
Registration	08:00
Welcome and overview: David York, Amanda Salis and Valter Longo	08:30
General Topic 1: Animal models of intermittent and periodic energy restriction <i>Fasting mimicking diets, abdominal fat loss, and multi-system regeneration</i> Valter Longo	09:00
REFRESHMENT BREAK	10:00
<i>Macronutrient balance in health and ageing</i> Samantha Solon-Biet	10:30
SHORT TALKS: ORAL ABSTRACT PRESENTATIONS	11:30
LUNCH	12:30
<i>Circadian regulation of metabolism for the prevention and treatment of metabolic diseases</i> Satchin (Satchidananda) Panda	14:00
<i>Optimizing weight loss outcomes by manipulating the level, duration and frequency of energy restriction</i> Amanda Salis (publishing as Sainsbury)	15:00
REFRESHMENT BREAK	16:00
General Topic 2: Clinical trials of intermittent & periodic energy restriction <i>Alternating periods of moderate energy restriction and well-controlled energy balance</i> Nuala Byrne	16:30
FINISH	17:30

Saturday 1st April 2017

	Start Time
Sponsored breakfast session: Ketosis and appetite regulation	07:00
General Topic 2: Clinical trials of intermittent & periodic energy restriction (continued)	09:00
<i>Potential benefits and harms of intermittent energy restriction</i>	
Michelle Harvie	
REFRESHMENT BREAK	10:00
<i>Alternate day fasting</i>	10:30
Leonie Heilbronn	
Intermittent use of energy restriction: practical application	11:30
<i>Jennifer Keogh</i>	
LUNCH	12:30
<i>Periodic fasting mimicking diet - effects in humans</i>	14:00
Sebastian Brandhorst	
<i>Long-term feasibility and efficacy of intermittent fasting</i>	15:00
Krista Varady	
REFRESHMENT BREAK	16:00
Summary / Wrap up Session:	16:30
What are the key gaps in knowledge to address in research going forwards?	
What can we recommend in clinical practice now?	
FINISH	17:30

EXHIBITORS

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Cambridge Weight Plan

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SPEAKER ABSTRACTS

Fasting mimicking diets, abdominal fat loss, and multi-system regeneration

Valter Longo, University of Southern California, USA

Nutrients and particularly amino acids and sugars can have potent effects on the activity of pathways that accelerate aging but also those that regulate fat breakdown. Based in part on the ability of fasting to promote ketogenesis, we investigated the effect of a periodic fasting mimicking diet (FMD) on the mouse lifespan and the mechanisms that may be responsible for its effect on aging. We showed that the periodic FMD, resulting deficiency in IGF-1 and PKA activity, promotes loss of abdominal fat, without a loss of subcutaneous fat or lean body mass. Cycles of the FMD also promote stem cell-based regeneration in the hematopoietic and other systems and ameliorate age-dependent dysfunction leading to healthspan and lifespan extension.

Macronutrient balance in health and ageing

Samantha Marie Solon-Biet, University of Sydney, Australia

Nutritional geometry has shown that the balance of dietary macronutrients has profound effects on health and ageing. Under ad libitum feeding conditions, long-term calorie restriction by dilution did not extend lifespan in mice. Rather, diets low in protein and high in carbohydrate (LPHC) improved cardiometabolic health, immune function, markedly elevated levels of Fibroblast Growth Factor 21 (FGF21) and increased longevity. When we compared diets varying in protein to carbohydrate ratio under both 40% caloric restriction and ad libitum conditions over 8 weeks, we found that ad libitum LPHC diets delivered similar benefits to CR in terms of levels of insulin, glucose, lipids and HOMA, despite increased energy intake. CR on LPHC diets did not provide additional benefits relative to ad libitum LPHC and show that LPHC diets under ad libitum-fed conditions generate the metabolic benefits of CR without a 40% reduction in total caloric intake. A central priority is to further investigate the long-term effects of different nutritional interventions such as intermittent fasting, CR and ad libitum LPHC diets on metabolic health and lifespan. Here, we evaluate the effects of ad libitum LPHC, 40% CR and BCAA supplementation on health and longevity in 960 mice. We investigate whether 1. CR is effective in delaying ageing because it limits intake of all macronutrients, including BCAA and 2. An ad libitum low protein (hence low BCAA) diet, coupled with high carbohydrates, can provide similar benefits as CR without a reduction in energy intake. If the mouse is a good model for humans in this regard, these findings could have important implications for diet management in late-life metabolic health and ageing.

Circadian regulation of metabolism for the prevention and treatment of metabolic diseases

Satchidananda Panda, Salk Institute, USA

Time-restricted feeding (TRF; 8-12 h food access in the active phase) without changing nutrient quantity improves daily oscillations in metabolic pathways and aligns them appropriately to the period of fasting or feeding. Subjecting rodents to TRF prevents excessive weight gain, adiposity, glucose intolerance, systemic inflammation, hepatosteatosis and hypercholesterolemia independent of diet type. Rodents on TRF also show increased endurance, motor coordination, and brown fat function. When high fat diet induced obese mice or mice with genetic predisposition to obesity are subjected to TRF, they also experience similar therapeutic benefits. TRF does not alter the major gut microbiome composition, yet it modulates gut metabolism of carbohydrates and bile acids. TRF in *Drosophila* maintained body weight, improved sleep, and delayed age-dependent or high fat induced decline in cardiac performance. The beneficial TRF effect on cardiac function is dependent on a functional circadian clock and is partly mediated by ATP-dependent chaperone function. Unbiased assessment of the temporal changes in transcriptome, metabolome and gut microbiome revealed TRF exerts pleiotropic effect on metabolism in multiple tissue types in both rodents and insects. To test the translational potential of TRF in humans, we have begun to monitor daily eating pattern using a novel unbiased, evidence-based, and scalable method. Preliminary data shows erratic eating pattern with extended period of frequent caloric intake events that potentially maintains a post-prandial metabolic state in humans in widespread. Time-restricted feeding without overt attempt to alter nutrition quality or quantity might be a potential new lifestyle intervention to improve health in humans.

Optimizing weight loss outcomes by manipulating the level, duration and frequency of energy restriction

Amanda Salis (publishing as Sainsbury), University of Sydney, Australia

A major reason for the failure of dietary interventions for overweight/obesity is that the body responds to energy restriction with adaptive responses that oppose indefinite weight loss and promote weight regain. These adaptive responses include increases in the drive to eat, decreases in energy expenditure, and hormonal changes that promote retention of fat tissue with concomitant loss of lean tissues. Some of these adaptive responses may be particularly intense when severe energy restriction is used to achieve weight loss. Animal research shows that adaptive responses to energy restriction are mediated by changes in the hypothalamus.

Because these hypothalamic changes can be normalised by a period of ad libitum feeding, it is possible that 'taking a break' from energy restriction during a dietary intervention for overweight/obesity may increase the efficiency of weight loss. Indeed, interrupting moderate energy restriction with 1-3 days of ad libitum feeding increased the efficiency of weight and fat loss in diet-induced obese mice, with concomitant differences in hypothalamic expression of proopiomelanocortin, relative to mice on continuous energy restriction (Seimon RV et al PLoS One 2016). Does this mean that human dietary interventions involving intermittent energy restriction similarly increase weight loss efficiency? In humans, at least some aspects of the adaptive responses to energy restriction may be abolished or attenuated by a period of greater food intake, but this phenomenon appears to be dependent upon restoration of true energy balance (where energy intake is matched to energy requirements and weight remains constant), or even positive energy balance (not continued energy restriction), and may take up to 2 weeks. We thus propose that 2-week periods of energy balance, applied intermittently during moderate or severe energy restriction, would thus increase the efficiency of weight/fat loss in adults with overweight or obesity, compared to continuous energy restriction. These concepts are currently under investigation in NHMRC-funded randomised controlled trials.

Clinical trials of intermittent & periodic energy restriction: Alternating periods of moderate energy restriction and well-controlled energy balance

Nuala Byrne, University of Tasmania, Australia

Resting energy expenditure (REE) is the largest component of total daily energy expenditure in humans, and therefore changes in REE can have a marked effect on energy requirements. As REE is determined largely by body size and composition, it is expected to decrease with weight loss. However, during energy restriction, REE has been reported to decrease to a greater extent than that predicted from changes in body composition; a phenomenon termed 'adaptive thermogenesis'. Adaptive thermogenesis leads to markedly reduced efficiency of weight loss. Finding ways to attenuate this adaptive decrease in REE during dietary energy restriction interventions may improve weight loss success.

A 'periodised' exercise training model intersperses exercise stress cycles with periods of reduced exercise volume designed to stimulate recovery and avoid possible long-term damage to functional capacity caused by chronically high training loads. We hypothesised that an intermittent approach to energy restriction, consisting of cycles of restriction interspersed with periods of energy balance, may attenuate compensatory responses associated with chronic energy restriction, and thus provide a more effective and sustainable weight loss strategy than continuous energy restriction. We have conducted randomised controlled trials to investigate the effect of repeatedly interrupting energy restriction with deliberate periods of energy balance (intermittent energy restriction) on body weight/

composition, and biological and behavioural determinants of body weight. Findings suggest intermittent energy restriction, delivered as alternating 2-week blocks of energy restriction and energy balance, results in more efficient weight loss, in part due to attenuation of the adaptive thermogenesis associated with continuous energy restriction.

Potential benefits and harms of intermittent energy restriction

Michelle Harvie, University Hospital South Manchester, UK

Intermittent energy restriction (IER) has become popular as a means of weight control amongst people who are overweight and obese, and is also undertaken by normal weight people hoping spells of marked energy restriction will optimise their health. This review summarises randomised comparisons of intermittent and isoenergetic continuous energy restriction for weight loss to manage overweight and obesity. It also summarises the potential beneficial or adverse effects of IER on body composition, adipose stores and metabolic effects from human studies, including studies amongst normal weight subjects and relevant animal experimentation. Six small short term (<6 month) studies amongst overweight or obese individuals indicate that intermittent energy restriction is equal to continuous restriction for weight loss, with one study reporting greater reductions in body fat, and two studies reporting greater reductions in HOMA insulin resistance in response to IER, with no obvious evidence of harm. Studies amongst normal weight subjects and different animal models highlight the potential beneficial and adverse effects of intermittent compared to continuous energy restriction on ectopic and visceral fat stores, adipocyte size, insulin resistance, and metabolic flexibility. The longer term benefits or harms of IER amongst people who are overweight or obese, and particularly amongst normal weight subjects, is not known and is a priority for further investigation.

Alternate day fasting

Leonie Heilbronn, The University of Adelaide, Australia

Alternate day fasting (ADF) improves health with minimal or no weight loss in chow fed rodents, suggesting that periodic cellular energy deprivation, rather than weight loss per se, is sufficient to improve metabolic health. ADF induces both weight loss and improved markers of metabolic health in humans, but few studies have compared ADF and daily caloric restriction (CR) approaches. We have completed a randomised controlled trial examining the metabolic health impacts of 30% energy restriction, induced by severe intermittent fasting (IF70) versus an energy matched moderate daily CR (CR70), in women who were obese for 8 weeks. We included a control group who ate daily and were not energy restricted, and a group who undertook intermittent fasting, without prescribed energy restriction (IF100). Clinically, IF70 produced more weight loss

SPEAKER ABSTRACTS

and greater reductions in fasting insulin, and increases in non-esterified fatty acids and ketones vs CR70. However, there was no difference in peripheral insulin sensitivity by clamp between these groups following fed days, and transient insulin resistance was induced following a fast in IF100. We also investigated markers of adipose tissue remodeling. Transient increases in markers of adipose tissue macrophages were observed following fasting days in IF70 and IF100 groups. Thus, adipose tissue specific responses may exist in response to severe intermittent versus moderate daily energy deprivation in humans, potentially to buffer increased lipolysis that occurs as a result of prolonged fasting. Whether this translates to differences in metabolic health over longer periods following IF diets is not clear.

Intermittent use of energy restriction: practical application

Jennifer Keogh, University of South Australia, Australia

Intermittent energy restriction is popular in the media but the effects on long term maintenance of weight loss are unclear. In Australia patients may be eligible for treatment paid for under Medicare's Chronic Disease Management - Individual Allied Health Services with a maximum of 5 visits/year. It important for dietitians to know which strategies are supported by evidence when choosing how to advise their clients.

This presentation will include discussion of data from 24 months of follow up from an on-going a weight loss study.

Periodic fasting mimicking diet - effects in humans

Sebastian Brandhorst, University of Southern California, USA

Calorie restriction or changes in dietary composition can enhance healthy aging, but the inability of most subjects to adhere to chronic and extreme diets, as well as potentially adverse effects, limits their application. Alternatively, acute cycles of prolonged fasting, in which only water is consumed for 2 or more days, reduce pro-growth signalling and activate cellular protection mechanisms in organisms ranging from single-cell yeast to mammals. In mammals, this is achieved in part by temporarily reducing glucose and circulating insulin-like growth factor 1 (IGF-1), a hormone well studied for its role in metabolism, growth, and development, as well as for its association with aging and cancer. Growth hormone receptor and IGF-1 deficiencies are associated with a reduced risk of cancer, diabetes, and overall mortality in humans. Despite its potential for disease prevention and treatment, fasting is difficult to implement in human subjects and may exacerbate nutritional deficiencies. We developed a fasting-mimicking diet (FMD) and investigated its effect on markers or risk factors for aging and diseases in a randomized clinical trial. Three FMD cycles reduced body weight, trunk, and total body fat; lowered blood pressure; and decreased IGF-1. No serious

adverse effects were reported. In a post hoc analysis, body mass index, blood pressure, fasting glucose, IGF-1, triglycerides, total and low-density lipoprotein cholesterol, and C-reactive protein were more beneficially affected in participants at risk for disease than in subjects who were not at risk. Preliminary data suggests that the FMD is potentially effective in the treatment of relapsing-remitting multiple sclerosis.

Long-term feasibility and efficacy of intermittent fasting

Krista Varady, University of Illinois at Chicago, USA

Objective: To compare the effects of alternate day fasting versus daily calorie restriction on weight loss, weight maintenance, and cardiovascular disease risk indicators over 12-months.

Methods: We randomly assigned 100 overweight and obese adults to 1 of 3 groups for one year: alternate day fasting (25% of energy needs on "fast days", and eating ad libitum on alternating "feast days"), daily restriction (75% of energy needs every day), or no-intervention control. The trial involved a 6-month weight loss phase followed by a 6-month weight maintenance phase.

Results: Alternate day fasting participants lost the same amount of weight as daily restriction participants by month 6 (6.1 and 6.5%; $P = 0.0001$ vs. controls). There was no significant weight regain in either intervention group during the weight maintenance period. Fat mass decreased similarly by month 6 in the intervention groups ($P < 0.01$ versus controls). Lean mass remained unchanged in all groups throughout the trial. During the weight loss phase, HDL cholesterol levels increased, while insulin levels decreased in the alternate day fasting group only ($P < 0.05$ for the interaction between diet group and time). Insulin resistance decreased similarly in the alternate day fasting and calorie restriction groups ($P = 0.01$ vs. controls). These metabolic benefits were not sustained by month 12 in either of the intervention groups.

Conclusions: Alternate day fasting is an effective weight loss and weight maintenance strategy, and should be considered in clinical practice for those who will not follow a daily restriction program. The long-term effects of alternate day fasting on cardiovascular disease risk indicators warrant further investigation.

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SPEAKER BIOGRAPHIES



David York

Wayne State School of Medicine, USA

David York retired in 2014 from his position as a Professor in the Biology Department at Utah State University.

Prior to that he was Associate Executive Director for Basic Science at the Pennington Center in Baton Rouge. He now has an adjunct appointment in Wayne State School of Medicine in Detroit where he now lives. He serves as Editor in Chief of Obesity Reviews and as Chair of the Publications Committee of World Obesity. It was his initiative to develop the Stock conference series and he has been responsible for organization of every conference to date. His lifetime of research on animal models of obesity focused particularly on understanding the central mechanisms that regulate feeding behaviour and peripheral metabolism. His early work showed the close integration of feeding behaviour with autonomic regulation of peripheral metabolism that has proven important in understanding the causes of obesity.



Valter Longo

University of Southern California, USA

Dr. Longo is the Edna Jones Professor in Gerontology and Professor in Biological Science. He is also the Director of the USC Longevity Institute. He is interested

in understanding the fundamental mechanisms of aging in yeast, mice and humans by using genetics and biochemistry techniques. He is also interested in identifying the molecular pathways conserved from simple organisms to humans that can be modulated to protect against multiple stresses and treat or prevent cancer, Alzheimer's Disease and other diseases of aging. The focus is on the signal transduction pathways that regulate resistance to oxidative damage in yeast and mice.



Samantha Marie Solon-Biet

University of Sydney, Australia

Samantha Solon-Biet is an NHMRC Early Career Fellow at the Charles Perkins Centre at the University of Sydney. Using

principles from nutritional ecology and physiology, her work is centered on understanding the complex role nutrition plays in mediating various aspects of metabolic health, reproduction

and ageing. A major focus of Samantha's research is to investigate how the balance of macronutrient influences the underlying nutrient signalling pathways that drive various behavioural and metabolic responses in mouse models.



Satchidananda Panda

Salk Institute, USA

Dr. Satchin Panda, Professor, Salk Institute studies the circadian regulation of behaviour and metabolism. Major discoveries from

his lab include the novel photoreceptor melanopsin that entrains hypothalamic circadian clock to ambient light dark cycle and the dominant effect of daily eating fasting cycle on sustaining robust diurnal rhythms in metabolic organs. Recently, his lab has demonstrated consolidating daily eating to 8-12 h interval can prevent and reverse several metabolic diseases and markers of aging. This discovery has inspired his team to design and deploy a smartphone app to monitor daily eating pattern (mycircadianclock.org).



Amanda Salis

University of Sydney, Australia

With a Bachelor of Science from the University of Western Australia and a PhD from the University of Geneva, Switzerland, Associate Professor Amanda Salis (publishing as Sainsbury)

leads full-time obesity research at the Boden Institute of Obesity, Nutrition, Exercise & Eating Disorders in the Charles Perkins Centre at the University of Sydney, Australia. Her translational research into hypothalamic control of appetite, energy expenditure, body weight and body composition spans studies with transgenic mice to randomized controlled weight loss trials in adults with overweight or obesity.

Her current randomized controlled trials comparing long-term effects of fast versus slow weight loss – using intermittent versus continuous energy restriction – are funded by a Senior Research Fellowship and Project Grants from the National Health and Medical Research Council of Australia. She is the author of two books about adult weight management that are available internationally in three languages and are used by patients, community health centres and health professionals (e.g. general practitioners, dietitians, diabetes educators and psychologists).



Nuala Byrne

University of Tasmania, Australia

Nuala is a Professor in Exercise Physiology and Energy Metabolism, and Head of the School of Health Sciences at the University of Tasmania.

One theme of her research spans the roles of resting and exercise metabolism in the aetiology and management of obesity and associated co-morbidities. Nuala has held the role of President of the Australia and New Zealand Obesity Society. With funding from the NHMRC, Nuala and her team investigate which is more important to achieving effective weight loss – metabolism or behaviour? Another research theme is exploring the relationship between protein metabolism and energy expenditure in optimising lean body mass.

humans, and much of her research is performed at the interface between basic and clinical science. She is currently interested in the role of inflammation in mediating responses in tissue.



Jennifer Keogh

Jennifer qualified as a dietitian from the College of Technology, Dublin, Ireland. Following a career in clinical dietetics and research she is now Associate Professor, Dietetics and Nutrition at the University of South Australia.

Jennifer's research is on the prevention and management of chronic disease using dietary change to achieve health benefits in obesity, diabetes and cardiovascular disease. She has on-going research on the use of intermittent dieting as a strategy for weight loss. Jennifer has 114 peer reviewed publications with 5518 citations and an h-index of 40.



Michelle Harvie

University Hospital South Manchester, UK

Dr Michelle Harvie is a research dietitian from the University Hospital South Manchester Trust. She qualified

as a dietitian in 1991. Her current research covers optimum diet and exercise strategies to prevent breast cancer and its recurrence. She has over 40 peer reviewed publications. She received the Association Study Obesity National Best practice award 2011 for her work on intermittent energy restricted diets. She is principal investigator for the B-AHEAD-2 trial and B-AHEAD 3 trials testing intermittent diets amongst early and advanced breast cancer patients receiving chemotherapy. Dr Harvie has published 3 self-help guides for the public to follow intermittent diets; The 2 day diet, The 2 day diet cook book and the quick and easy edition. All author proceeds go to The Prevent Breast cancer charity. www.preventbreastcancer.org.uk



Sebastian Brandhorst

University of Southern California, USA

Dr. Brandhorst's research is focused on the nutritional regulation of aging and age-related diseases.

He demonstrated that short-term starvation, low calorie and/or low protein diets, so called fasting-mimicking diets, can extend longevity in mice and protect organisms from the toxic side-effects of chemotherapy drugs while sensitizing many types of cancer cells. Benefits of a fasting-mimicking diet included rejuvenation/regeneration of the hematopoietic and the neuronal system in a mouse health- and lifespan study. A human adapted version of the fasting-mimicking diet reduced markers/risk factors for aging, diabetes, cancer, and cardiovascular disease in a randomized cross-over trial.



Leonie Heilbronn

The University of Adelaide, Australia

Associate Professor Leonie Heilbronn's research at the University of Adelaide and the South Australian Health and Medical Research Institute (SAHMRI), is focused on identifying optimal,

sustainable, eating patterns that will prevent the development of type 2 diabetes in at-risk populations. Intermittent fasting, and time restricted feeding, have emerged as tools that improve glucose metabolism in mouse models, and reset peripheral clocks. Whether these tools improve glycaemic health in humans, and be sustainable, is unclear. She also seeks to understand the mechanisms underpinning these relationships in



Krista Varady

Krista Varady, PhD, is an Associate Professor of Nutrition at the University of Illinois, Chicago. Her research focuses on the efficacy of intermittent fasting for weight loss, weight maintenance, and cardio-protection in obese

adults. Her work is funded by the NIH, American Heart Association, International Life Sciences Institute, and the University of Illinois. She has published over 50 publications on this topic, and is also the author of a book for the general public, entitled the "Every Other Day Diet".

SUBMITTED ABSTRACTS

Intermittent fasting promotes weight loss, and improves inflammation and glucose tolerance in high-fat diet fed mice

Bo Liu, George Hatzinikola, Amanda J Page, Gary A Wittert, Leonie K Heilbronn

Discipline of Medicine, the University of Adelaide, Adelaide, Australia, 5005

South Australian Health and Medical Research Institute, Adelaide, Australia, 5005

Background: Intermittent fasting (IF) promotes weight loss and improves markers of insulin sensitivity in human and animals. The effects on adipose tissue inflammation are unclear.

Methods: Male C57BL/6J mice were fed a high-fat diet (HFD; 43% fat) or standard chow (SC; 18% fat) for 8wks ad-libitum (AL), and randomised to AL or IF for another 8wks. IF was initiated at Z11 for 24hrs on 3 non-consecutive days/week. Body weight and energy intake (EI, KJ) were measured daily and oral glucose tolerance (2g/kg body weight) at 24wks. Energy expenditure (EE, kcal/kg/24hrs) was measured by indirect calorimetry. Gonadal fat was harvested, and markers of inflammation and extracellular matrix examined by qPCR.

Results: Increases in body weight were greater in SC-AL and HFD-AL vs. IF groups ($P < 0.05$). SC-IF mice maintained body weight ($+0.2 \pm 0.6$ g), but HFD-IF mice lost weight (-8.7 ± 2.3 g, $P < 0.001$). Gonadal fat mass was smaller in IF vs. AL mice ($P < 0.01$). EI was similar between SC groups, but 26% lower in HFD-IF vs. HFD-AL mice. EE was reduced on fasted vs. fed days ($P = 0.01$). On fed days, EE was higher in HFD-IF vs. HFD-AL mice ($P < 0.01$). IF improved glucose tolerance in SC and HFD vs. AL ($P < 0.001$), and in SC-IF vs. HFD-IF mice ($P < 0.05$). Inflammation (Nos2, Arg1, Erg2 and CCL2) and extracellular matrix (Col6a1, Mmp2 and Timp1) markers were decreased in SC-IF, SC-AL and HFD-IF vs. HFD-AL ($P < 0.01$).

Conclusions: Intermittent fasting decreases energy intake, fat mass, and markers of adipose tissue inflammation, increases energy expenditure, and improves glucose tolerance in diet-induced obese mice.

Glucose-sensing neurons of the mediobasal hypothalamus project to brown adipose tissue

Mirabella PN, Spanswick DC, Oldfield BJ

Department of Physiology, Monash University, Australia

One of the pathways by which post-prandial thermogenesis occurs in brown adipose tissue (BAT) involves nutrient sensing neurons in the hypothalamus and multisynaptic descending projections directed to the sympathetic outflow to BAT. We have examined this using combinations of viral tracing and tissue slice electrophysiological techniques in conjunction with increased extracellular glucose concentrations.

Injection of the GFP-tagged, transsynaptic retrograde virus, pseudorabies virus (PRV), into the interscapular BAT of Sprague-Dawley rats allowed for identification of neurons with polysynaptic projections to BAT. Whole-cell patch clamp recordings were performed on GFP+ neurons from sections of the arcuate nucleus (ARC) and retrochiasmatic area (RCh). Increasing the extracellular glucose concentration from 1mM ("fasted") to 5mM ("fed") revealed both glucose-excited (6.00 ± 0.84 mV; 0.63 ± 0.18 Hz; (26%)) and glucose-inhibited (-5.34 ± 0.75 mV; -0.34 ± 0.07 Hz; (37%)) BAT-directed neurons in the ARC. Similarly, there were also substantial numbers of glucose-excited (7.32 ± 2.20 mV; 0.75 ± 0.22 Hz; (56%)) and also glucose-inhibited (-3.12 ± 2.24 mV; -0.80 ± 0.44 Hz; (6%)) neurons in the RCh that projected polysynaptically to BAT. Retrospective immunohistochemical analyses of biocytin-filled cells revealed both POMC+ ($n=15$) and POMC- ($n=4$) glucose-sensitive neurons in both regions.

These data provide a basis for the postprandial regulation of BAT thermogenesis through glucose-sensing mechanisms in hypothalamic neurons.

Effects of time-restricted vs unrestricted eating on glycemic profiles and circadian metabolomics over 24 hours: Study protocol

E.B. Parr (1), B.L. Devlin (1), J.A. Hawley (1,2)

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(2) *Sport and Exercise Sciences, Liverpool John Moores University, Liverpool, L3 3AF, UK*

Background: Time-restricted feeding (TRF), where energy is consumed within a defined time period (~8 h), improves metabolic profiles and reduces weight gain in rodent models. To investigate TRF in humans, this 24-h laboratory-based study will investigate the effect of TRF versus unrestricted feeding (URF) in the face of a high-fat diet (HFD) on circadian glucose, insulin, lipids, appetite and incretin hormones profiles and metabolomics measures.

Methods: Ten male, sedentary adults (30-45 y; BMI: 27 – 35 kg/m²) will be enrolled in this randomized, cross-over design study. Participants will complete both dietary protocols, of consuming three main meals of a HFD (50% fat, 30% carbohydrate and 20% protein) at either 1000, 1300 and 1700 h (TRF, 8 h) or 0700, 1400 and 2100 h (URF, 15 h) for five consecutive days. On the fifth day, participants will attend the laboratory for a 24 h stay to have hourly blood and 4-hourly muscle biopsy samples taken. The primary outcome measures are changes to circadian blood profiles of glucose and insulin and metabolomics. Secondary outcome measures include the change in lipid profile, appetite hormones, incretin hormones, and inflammatory markers from plasma, and the gene and protein expression from muscle.

Discussion: In the face of a high-fat diet, time-restricted feeding may be an effective strategy to 'rescue' the disruptions to circadian patterns of blood markers and metabolomics measures compared with an unrestricted intake of a high-fat diet, that has previously been shown to be detrimental to metabolism in rodent models.

Immediate and longer-term effects of Ramadan fasting on body weight and body composition: a systematic review and meta-analysis

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Boden Institute of Obesity, Nutrition, Exercise & Eating Disorders, Sydney Medical School, Charles Perkins Centre, University of Sydney, NSW, Australia

*Equal contribution

Due to the high degree of variability observed in weight and body composition outcomes in Ramadan studies, this systematic review and meta-analysis aims to establish the overall patterns of change in these parameters during and after the fasting period. Literature searches were done in September 2016 using the Medline, Pre-Medline, Cinahl, Embase, Global Health and Scopus databases, with no restriction on publications year. Data were collected from: pre-Ramadan (3 weeks before Ramadan until 2 days after Ramadan commencement), end-Ramadan (between the 3rd week of Ramadan until 3 days after the end of Ramadan) and post-Ramadan (between 1 to 6 weeks after the end of Ramadan). Ramadan fasting caused a significant reduction in weight between pre- and end-Ramadan (-1.34 kg; $p=0.000$). By post-Ramadan, the significance of this change had decreased (-0.67 kg; $p=0.035$). Similar decreases were observed with all body composition parameters between the pre- and end-Ramadan time points, although the lack of available data made it difficult to confidently establish changes up to post-Ramadan. Importantly, there were discrepancies with body composition data in many studies due to the use of imprecise equipment/techniques. Greater weight losses were observed in overweight/obese groups (-1.95 kg; $p=0.014$) compared to normal-weight groups (-1.41 kg; $p=0.060$) by end-Ramadan. In conclusion, Ramadan fasting consistently causes reductions in weight and body composition parameters, and individuals with overweight/obesity demonstrate larger weight losses. Data insufficiencies made it difficult to make precise conclusions about the follow-up period. Furthermore, superior measuring techniques need to be used for more accurate body composition analyses.

Intermittent Fasting in the 'Real-World'

Dr Melyssa Roy (1), A.Prof. Rachel Brown (2), Ms Michelle Jospe (2), A.Prof. Sheila Williams (3), Prof. Rachael Taylor (1)

(1) Department of Medicine, University of Otago, New Zealand

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Intermittent fasting is a popular strategy for weight loss, however its efficacy when implemented without ongoing supervision in the 'real-world' has not been well examined. As part of a larger randomised controlled trial, this cohort analysis examined the effects of intermittent fasting, consisting of two days per week of restricted energy intake, in 136 healthy overweight adults over a 12-month period. This study specifically examined anthropometric and health outcomes, and 'real-world' long-term adherence to unsupported intermittent fasting. Participants in this study received a single initial education session, with recommendations made to limit daily energy intake twice weekly to 2100kJ calories for females and 2500kJ for males. Resources provided to participants included general advice on undertaking fasting, with some suggestions for possible food choices, and recipes. The participants were assessed after 6 and 12 months of independent intermittent fasting. The efficacy of the dietary intervention was evaluated using anthropometric outcomes including bodyweight, body fat (DXA) and waist circumference, with blood pressure, HbA1c, and biomarkers such as lipids and hsCRP also taken. In addition, long-term diet tolerability and adherence, along with dietary choices were assessed. The impact of intermittent fasting on appetite and eating behaviours were evaluated using validated questionnaires, including measures of disordered eating, and blood concentrations of ghrelin. This presentation will discuss the outcomes from this unique study of 'real-world' intermittent fasting in a large group of overweight adults, and will provide important information to assist in the development of guidelines to improve the efficacy of this approach.

Effects of continuous versus intermittent energy restriction on weight loss and appetite

King NA (1), Wood RE (2), Sainsbury A (3), Hills AP (2), Byrne NM (2)

(1) Queensland University of Technology, Australia

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(3) University of Sydney, Australia

The aim of this study was to compare weight loss and appetite responses between continuous (CONT) and intermittent (INT) energy restriction (ER). Forty-one males with obesity (mean body weight 109 ± 11.0 kg) were randomly assigned to either 16 weeks of continuous ($n=21$) or intermittent ($n=19$) ER. The continuous ER was completed as 16 weeks of daily ER. The 16 weeks of intermittent ER was completed as 8, 2-week blocks alternating with 2-week blocks of energy balance, for 30 weeks in total. During ER both groups were prescribed a 30% reduction in energy intake based on individual measurements of resting energy expenditure and self-reported physical activity levels. At weeks 0, 8 and 16 we assessed subjective appetite sensations using visual analogue scales, energy intake at an ad libitum test meal and eating behaviour characteristics using the Three Factor Eating Questionnaire (TFEQ).

SUBMITTED ABSTRACTS

Despite identical imposed ER, the CONT and INT groups experienced significantly different weight losses ($7.6 \pm 3.8\%$ and $12.3 \pm 4.5\%$ respectively) after 16 weeks ($p < 0.001$). The TFEQ showed that dietary restraint increased similarly and significantly in both the CONT (7.0 to 10.8) and INT (7.7 to 11.5) groups ($P < 0.0001$ versus baseline), while disinhibition remained unchanged. Fasting hunger increased over baseline (week 0) in the CONT group and decreased in the INT group; this difference approached significance ($p = 0.08$). There were no differences between INT and CONT in changes in test meal energy intake. These data suggest that this strategy of intermittent ER could lead to improved weight loss by preventing the orexigenic response typically associated with weight loss.

The use of meal replacements for weight loss: a systematic review and meta-analysis

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Nuffield Department of Primary Care Health Sciences, University of Oxford, Oxford UK

Introduction: Meal replacements (MR) are portion controlled or pre-packaged foods intended to aid weight loss. Although MR are widely available and have been shown to be effective in small short-term research studies, they are not recommended in most current guidelines for the management of obesity. A systematic review of 6 studies in 2003 observed significantly greater weight loss at 3 months but was inconclusive in the longer term.

Methods: We searched (to August 2016) for randomised controlled trials in adults (≥ 18 years) with a BMI ≥ 25 kg/m², comparing the use of one or more MR daily with comparator interventions, with weight loss reported at 1 year or longer. Standard Cochrane review methods were used. Our primary outcome was weight change at 12 months (mean; 95% CI), using baseline observation carried forward to account for missing data.

Results: We included 18 studies randomising 3627 participants to MR and 3242 to a comparator. In studies not including a behavioural programme (BP), participants randomised to use MR lost more weight than diet advice alone ($n=7$: -2.96 kg; -3.97 , -1.95) $I^2 = 66\%$. Participants randomised to MR as part of a BP lost more weight more than BP alone ($n=6$: -1.42 kg; -1.97 , -0.86) $I^2 = 0\%$, diet advice alone ($n=2$: -3.98 kg; -7.06 , 0.91) $I^2 = 45\%$, or a minimal control ($n=2$: -4.4 kg [-10.87 , 2.07]) $I^2 = 100\%$.

Conclusion: The use of MR increases weight loss at 1 y, suggesting that their use should be reconsidered within clinical guidelines for weight management.

Improvements in glucose metabolism after energy restriction – contribution of gut microbiota?

Assoc Prof Rinki Murphy

University of Auckland, Auckland, New Zealand

Gut microbiota are emerging as novel mediators of obesity and type 2 diabetes. Energy restriction has an important role in reversing both conditions but is difficult to sustain. Favourable alterations of gut microbiota have been observed with energy restriction, which may be recapitulated to some extent through probiotics, prebiotics, antibiotics, bariatric surgery and fecal transplantation, thereby resetting healthy glucose metabolism.

The following studies have been conducted or are underway by our group to investigate this hypothesis:

- Bariatric surgery vs equivalent caloric restriction for up to 3 days have similar acute effects on glucose metabolism (Yip Obes Surg 2014)
- Contrasting changes in gut microbiota are seen at 1 year after Sleeve Gastrectomy vs Roux-en-Y Gastric Bypass types of bariatric surgery mimicking caloric restriction purely through restricted stomach volume vs bypassed stomach and small intestine respectively (Murphy Obes Surg 2016)
- Probiotic effects on preventing disordered glucose metabolism without energy restriction – could this be amplified with energy restriction? Probiotics in Pregnancy study without specific dietary recommendation, showed reduced gestational diabetes among those randomized to probiotic supplementation with *Lactobacillus rhamnosus* HN001 (2.1% [95%CI 0.00-0.66]) vs 6.5% [95%CI 3.5-10.9] in placebo group, $p = 0.03$. Wickens BJN in press. PROFAST study is underway to test whether this probiotic enhances prevention of T2D among people with prediabetes who practice intermittent fasting.
- Study underway to test whether fecal transplantation from healthy lean donors to overweight recipients (with either prediabetes or diet controlled T2D) via the colonic route improves insulin sensitivity up to 12 weeks later.

The intermittent fast diet and insulin resistance in adolescents with obesity

SP Garnett, N Lister, M Gow, H Jebiele, K Chisholm, CT Cowell, LA Baur

Institute of Endocrinology and Diabetes, The Children's Hospital at Westmead

Discipline of Paediatrics and Adolescent Health, University of Sydney

Aims: To investigate 1. the effectiveness and acceptability of an intermittent fast diet (IFD), involving 3 days/week of a Very Low

Energy Diet (VLED) plus 4 days/week of a standard healthy diet in adolescents with obesity and 2. assess the nutritional adequacy of the diet.

Methods: During weeks 1-8 participants followed an IFD. A food hamper was provided for the VLED days. Participants purchased their own food weeks 9 to 12. After 12 weeks participants were given a choice of different dietary strategies which included 1-3 days of VLED or a standard healthy diet. Outcomes weight, insulin sensitivity, lipids, vascular structure and function, quality of life and eating behaviours were measured at 26 weeks. Dietary modelling was used to assess nutritional adequacy.

Results: To date 27/30 adolescents have been recruited, 19 have completed 12 weeks, 13 of these have completed 26 week intervention. Recruitment will be complete February 2017. In the first 12 weeks a modest mean weight loss (n=8: -2.7 kg) was observed. Dietary modelling indicated that IFD can be adapted to achieve nutritional adequacy and energy restriction; however careful selection of food is required. Further results are currently being analysed and will be presented.

Conclusion: Based on this pilot study we will commence a multi-centred, National Health and Medical Research Council (NHMRC) funded, RCT in 2017 with collaborators Truby (Monash), Vardy (Illinois, Chicago), Collins (Newcastle) and Paxton (La Trobe). Participants will commence the study with a 4 week VLED to "jump-start" weight loss before transitioning to IFD.

Intermittent Energy Restriction and Medication Management in Type 2 Diabetes

Carter S, Clifton PM, Keogh JB

Intermittent energy restriction (IER), in the form of a 2-day very low energy diet, is an alternative method to achieve weight loss that can be used for the management of type 2 diabetes mellitus (T2DM). Due to the severe energy restriction required for IER diets to be effective, management of oral hypoglycaemic agents and insulin, is required to prevent unwanted hypo or hyperglycaemic events. As demonstrated in our recent pilot trial, medication changes are usually only required on IER days unless glycemic control is excellent. Our medication protocol requires discontinuation of sulfonylureas as well as insulin if baseline HbA1c is < 7%. If HbA1c is > 7% but < 10% then medications are discontinued only on IER days and if HbA1c is > 10% medications remain unchanged. Guidelines outlined here can be used in the initial stages of a 2-day IER diet, but extensive blood glucose monitoring and professional supervision is still required to make the necessary individual reductions to medications in response to weight loss.

Carter S, Clifton PM, Keogh JB. Intermittent energy restriction in type 2 diabetes: A short discussion of medication management. *World Journal of Diabetes*. 2016;7(20):627-630. doi:10.4239/wjd.v7.i20.627.

Ramadan dan voluntary fasting – a method of intermittent and periodic energy restriction for attaining and sustaining weight loss

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(4) Department of al-Quran & Sunnah, Faculty of Islamic Studies, University Kebangsaan Malaysia, Malaysia

Introduction: A month-long compulsory Ramadan fasting and voluntary fasting throughout the year may serve as unique method of intermittent and periodic dietary and energy restriction. This study was carried out to determine if fasting is an effective approach to weight loss.

Methods: A quasi-experiment was carried out among two groups of overweight and obese Muslim women. The control group (Group B) received standard intervention - promotion of food portion control according to the national dietary guidelines. The intervention group (Group A) received the standard intervention plus the promotion of voluntary fasting and religious motivation to practice food portion control and voluntary fasting. The variables measured were voluntary fasting practices, frequency of vegetable and fruit consumption per week and quantity of carbohydrate and protein consumed per day, body mass index (BMI), blood pressure, HDL-C and TC/HDL-C ratio; all assessed at baseline (before Ramadan) and at 3 months post-Ramadan.

Results: At 3 months post-Ramadan, the practices of voluntary fasting increased only in Group A ($p = <0.01$). The quantity of protein and carbohydrate consumed per day, mean diastolic pressure and TC/HDL-C ratio decreased only in Group A (differences between group; $p <0.01, 0.05, 0.02$ and <0.01 respectively). The frequency of vegetable consumption per week as well as HDL-C increased only in Group A (differences between group; $p=0.03$ and <0.01 respectively). Although the BMI changes between groups were not significant ($p=0.08$), the BMI decrease within Group A was significant ($p<0.01$).

Conclusion: Ramadan fasting followed by voluntary fasting is effective in attaining and sustaining weight loss.

SUBMITTED ABSTRACTS

Morning sickness: 'Fasting and Starving' to Manage Micronutrients & Microbes

Anne-Thea McGill

In so called 'subsistence' cultures, pregnancy is diagnosed by the occurrence of morning sickness and pica. However, little is known about the strong drives to decrease appetite, and the variety of (plant) food, or consumption of non-nutritive items during early pregnancy.

Morning sickness, during embryogenesis, is the only time in the human lifecycle that there is a variably severe, periodic alteration to appetite that is aversive to most highly Long hours of daily fasting, and even 'starvation', result, with some women losing 'weight' during the first few weeks of pregnancy. However, their babies classically 'do well'. Furthermore, women may resort to ingesting 'adsorbent-type', not-nutritive items. Pica also occurs, possibly to neutralise food-related xenobiotics, including ingested and resident microbial products.

If the above theory is correct, during morning sickness, the slim, healthy pregnant woman's body carefully releases the appropriate vitamins, mineral and phytonutrients, including folic acid, iodine, long-chain fatty acids, unknown chemicals and energy to the developing embryo.

In this paper, the mechanisms behind the storage of these micronutrients, their metabolism and release during periods of fasting will be explored. Is the liver processing the micronutrients? Is autophagy employed?

What is happening to the obese women whose pre-pregnancy diet is frequently deficient in complex plant food, and variably fermenting, or mildly 'contaminated' animal products?

The metabolism in pregnant women, who are overweight/obese, on a 'xenobiotic - refined, addictive, toxic, energy-dense, depleted (X-RATED)' high health-risk diet, have less morning sickness but more perinatal and paediatric health problems, is reviewed.

Personalised medical nutrition therapy to improve diet related chronic disease outcomes

Clare E Collins

Professor of Nutrition and Dietetics, Director of Research, School of Health Sciences, Faculty of Health and Medicine, Acting Director Priority Research Centre in Physical Activity and Nutrition, University of Newcastle, Callaghan, NSW, Australia

Poor diet now contributes to the greatest the burden of disease in Australia, accounting for 10% of disability adjusted life years. Poor diet quality is common across all life stages and increases morbidity and mortality from CVD and diabetes by 15-40%. I have developed methods to individually tailor nutrition advice, provide personalised feedback and give health professionals access to nutrition data to use in real-time to assist people to eat better,

thereby attenuating chronic disease risk factors. It has not been possible to do this before as we did not have the technological capacity to provide feedback in a temporal and efficient way. Enabling technology tools and approaches I have developed means that - now we do!

My research is transforming the way personalised medical nutrition therapy is delivered and used, through developing and evaluating novel, targeted and tailored approaches that translate nutrition evidence into practical strategies for individuals. I am bridging the evidence-to-action gap in nutrition using tailored technology components to motivate and support people to optimise their eating patterns and diet quality. Through interdisciplinary collaborations with health professionals I am evaluating low cost nutrition assessment technology in healthcare pathways at specific life stages, including young adulthood and pregnancy; as well as chronic conditions including obesity and type 2 diabetes. This is improving health and quality of life while helping manage diet-related morbidity and mortality.

20 Years at The Front Line

Greame Wright

We have been collecting data for the last 20 years, on overweight and obese West Australians in Perth, within a private fee for service Clinic.

Our work has always been "evidence based". This evidence is within real life environments, real people, paying real money, all wanting results. Since our inception we have had a strong affiliation with the University of Western Australia.

We have used VLED's (Optifast 70 – Optifast 800). We have used different calories (400 v 800) but obtained similar weight loss. Health profiles were altered significantly - even on healthy obese individuals. Compliance has played a significant role in success, if measured by weight loss – across all levels of overweight and obesity classes. Our work revealed that when using the same weight management approach or program – results varied significantly. Individual differences in response to the standard approach was becoming more evident. We needed to do more and think differently.

Our work then focused on hormonal and metabolic profiles. Profiling people allowed great personalisation of data review and application of the data. Clients displayed a vast range of metabolic and hormonal differences...so why manage them the same? Tailoring the approach to individuals to manage their weight is our next challenge.

We need to find the best combination of data points, realise maximum weight and health outcomes to ensure longer term benefits for each individual.

Maybe we will be at the front line for another 20 years?

Unravel The Ramadhan Fasting Yoyo Effect: Indonesian Prospective Study on Overweight/Obesity Individuals

Harry Freitag Luglio

Faculty of Medicine, Universitas Gadjah Mada

Background: Ramadhan fasting has been reported to successfully reduced body weight, fat mass and waist-hip circumference. However, this is mostly followed by weight regain after 2 weeks from the end of Ramadhan. Currently, there is no explanation on how this rebound phenomena occurred.

Objective: The aim of this study was to examine the role of lifestyle, hormonal and genetic background on weight regain after Ramadhan fasting in overweight individuals.

Methods: This is an observational study with prospective cohort design. Subjects were overweight/obese men and women adults with age between 21 and 56 years old. Body weight, height, percent fat, fat free mass and hip-waist circumference were measured before (week 0), 28 days after Ramadhan fasting (week 4) and 2 weeks after the end of Ramadhan (week 6).

Results: The body weight was significantly reduced at the end of Ramadhan (week 4, $p < 0,0001$) and increased after Ramadhan (week 6, $p < 0,0001$). Leptin was significantly reduced after Ramadhan ($p = 0,018$) and we found that leptin level at the end of Ramadhan was associated with percent body weight reduction ($p = 0,011$). We develop a calculation for weight rebound called weight rebound score (WRS). In this study we showed that WRS was significantly correlated with total energy intake before Ramadhan ($p = 0,013$).

Conclusion: We conducted a study to understand Ramadhan fasting yoyo effect in overweight and obese individuals and we argued that dietary factor prior to the fasting has a significant impact on this phenomenon.

Effects of severe versus moderate energy restriction on body composition

Radhika V Seimon (1), Alice A Gibson (1), Claudia Harper (1), Michelle SH Hsu (1), Sally McClintock (1), Hamish A Fernando (1), Tania P Markovic (1),(2), Janet Franklin (2), Ian D Caterson (1), Neil King (3), Nuala M Byrne (4), Amanda Sainsbury (1)

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(2) *Metabolism & Obesity Services, Royal Prince Alfred Hospital, NSW, Australia*

(3) *Queensland University of Technology, Australia; 4Health Sciences and Faculty of Health, University of Tasmania, TAS, Australia*

Introduction: One of the outstanding questions about intermittent fasting as an intervention for overweight and obesity is its potential effects on body composition (fat mass, fat distribution and lean body mass). Severe energy restriction is used in intermittent fasting regimes, albeit intermittently, but there are concerns about potential adverse effects on body composition. Although diets involving continuous severe energy restriction (as in very low energy diets based on meal replacements) are one of the most effective dietary obesity treatments currently available, it is not clear whether these diets produce adverse effects on body composition. We therefore compared the effects on body composition of severe energy restriction (where energy intake was reduced by ~70% of weight maintenance requirements) versus moderate (~30%) energy restriction.

Methods: 101 post-menopausal women were enrolled in the TEMPO Diet Trial (Type of Energy Manipulation for Promoting optimum metabolic health and body composition in Obesity; Australia and New Zealand Clinical Trials Registry Reference Number 12612000651886). Participants were randomised to either 16 weeks of severe energy restriction ($n = 50$, BMI 34.3 ± 2.5 kg/m², age 57.5 ± 4.4 years) or moderate energy restriction ($n = 51$, BMI 34.8 ± 2.4 kg/m², age 57.6 ± 4.3 years). Body weight and body composition (measured by dual-energy X-ray absorptiometry or air displacement plethysmography) was measured at baseline (BL), 4 and 16 weeks after commencing energy restriction.

Results: By 16 weeks, 2/50 participants had dropped out of the severe and 8/51 from the moderate energy restriction groups, respectively. There was a significant decrease in weight in both groups (severe energy restriction BL 90.0 ± 9.5 kg; 4 weeks 83.8 ± 9.1 kg; 16 weeks 72.8 ± 8.7 kg; moderate energy restriction BL 91.6 ± 8.0 kg; 4 weeks 88.3 ± 7.8 ; 16 weeks 84.4 ± 8.1 kg). In this talk I will present data on changes in body composition at 4 and 16 weeks for the two groups.



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ATTENDEE BIOGRAPHIES

Alice Gibson

Alice Gibson is an Accredited Practising Dietitian. She recently completed her PhD, which looked at strategies to promote and measure adherence to dietary weight loss interventions. Her post-doctoral research will focus on modifiable risk factors for preventing cognitive decline. In particular she plans to pilot an intermittent fasting diet in older adults with obesity to determine whether the neuroprotective properties shown in animal models, translate to humans.

Anne-Thea McGill

I am a trained GP (FRNZCGP/FAEGRACGP) (clinical & academic). My involvement in obesity (& related evolutionary: nutrition, eating patterns & metabolic syndrome research) started, 1996, after attending Australian ANZOS meetings. My part-time research career began, 1999, graduating with a PhD, 2012, from the GP & Primary Care department, & Human Nutrition Unit, University of Auckland, NZ. I moved to Australia, 2015 (family reasons). I continued designing/ overseeing NZ Govt 'Supporting Weight Management in Primary Care' & Massey 'Microbiome & Obesity' projects. I take up local clinic specialist GP, & Southern Cross University environmental health project advisor, positions, Feb 2017.

Barbara Fam

Dr Fam is currently a Research Fellow at The University of Melbourne, Department of Medicine (Austin Hospital), where her major research focus is understanding how susceptibility and resistance to diet-induced obesity develops. Her work is solely basic science utilizing a variety of animal models of obesity including gain and loss of function models and environmentally induced models. She is currently investigating the role of the gut microbiome and epigenetic changes of key genes involved in satiety and body weight regulation as the prime target for this inter-individual response.

Barbora de Courten

I am a National Heart Foundation Future Leader Fellow working at Monash University and also a practicing physician. I have expertise across the translational research continuum from human mechanistic studies to clinical trials through to practice.

My vision is to establish new strategies for prevention and management of chronic diseases, specifically obesity, diabetes and cardiovascular disease.

I am passionate about identifying and providing evidence for safe, low-cost and easily scalable interventions with potential to have an immediate public health impact to prevent and treat

chronic diseases.

Bo Liu

Bo Liu is a PhD student at the University of Adelaide and the South Australian Health and Medical Research Institute.

He obtained his medical degree in China and completed his medical residency and advanced training in geriatrics in Beijing, China. In 2014, he moved to Adelaide to undertake his PhD study supervised by A/Prof Leonie Heilbronn. His research focuses on obesity and involves both clinical and basic approaches. His PhD project aims to examine the effects of calorie restriction vs. intermittent fasting on weight loss and insulin sensitivity, and mechanisms underpinning these particularly in adipose tissue and skeletal muscle.

Brian Oldfield

Professor Brian Oldfield is an NHMRC Principal Research Fellow with an appointment in the Department of Physiology, Monash University. He is the current President of the Australian and New Zealand Obesity Society, immediate past Chair of the Victorian Obesity Consortium and holds positions on a number of Obesity related Boards and Advocacy groups including the Scientific Advisory Board of Novo Nordisk.

He has an interest in the central neural regulation of energy balance with a focus on energy expenditure, particularly in brown adipose tissue and inducible brown-like fat in white adipose tissue, so-called beige fat.

His research in this area has been driven over a number of years by the utilisation of genetically-modified neurotropic viruses to identify the central neural pathways involved in the innervation of these tissues. More recently, these approaches have been combined with patch clamp electrophysiology and laser microdissection of single identified BAT – directed neurons as well as RNA seq to elucidate potential candidates that may be targeted to augment the energy expenditure capabilities of BAT and other brown-like fat cells.

Brooke Devlin

Dr Brooke Devlin (BExSci, MNutrDiet, PhD) is currently a Clinical Research Officer (Dietitian) within the Centre for Exercise and Nutrition. Brooke is an Accredited Practising Dietitian (APD) with a background in both clinical dietetic practice as well as exercise and nutrition research. Her current research is focusing on work regarding the influence of diet modifications, exercise interventions and time-restricted feeding on circadian metabolomics under the supervision of Professor John Hawley and collaborating with Professor Paolo Sassone-Corsi.

ATTENDEE BIOGRAPHIES

Carly Moores

Carly is a post-doctoral researcher and nutritionist from Adelaide, South Australia. She is a member of the evaluation team of the PEACH™ Queensland Project (2013 – 2017). Parenting, Eating and Activity for Child Health (PEACH™) is a parent-led family-focussed lifestyle intervention for family management of childhood overweight and obesity. The PEACH™ QLD Project involved upscaling of the efficacious PEACH™ intervention for statewide delivery to over 1000 children in Queensland. Additionally, Carly is interested in the potential for incorporating emerging eHealth and mHealth technologies in intervention studies to improve compliance and efficacy of diet and lifestyle interventions.

Chin Moi Chow

I have had a long standing interest in sleep health research with a focus on the impact of lifestyle factors (dietary, thermal comfort, exercise, daytime napping, altitude training) on sleep quality and patterns. My research group has investigated the role of glycemic index on sleep. I am interested in the relationship between sleep and obesity, in particular, the mechanisms that underlie the paradoxical observation that acute food restriction increased slow wave sleep (deep sleep), whereas chronic fasting decreased slow wave sleep.

Claire Morbey

Originally from London, Claire completed her undergraduate medical training at the University of Leeds. Sun, sand and sea soon beckoned her to Australia in 2000. Claire completed her endocrinology training at the John Hunter Hospital in Newcastle and Royal Darwin Hospital and started in private practice in 2008. Claire's main area of interest is in type 1 diabetes management with a special interest in pump therapy.

Clare Collins

Professor Collins is Research Director, School of Health Sciences, Faculty of Health and Medicine, NHMRC Senior Research Fellow, and Acting Director, Priority Research Centre in Physical Activity and Nutrition, the University of Newcastle, NSW, Australia. She led development of adult weight management clinical guidelines for Dietitians Association of Australia. Her research uses smart technologies to assess dietary intake, evaluate nutrition interventions' impact on eating patterns, weight and health across key life-stages and chronic health conditions. As a nutrition media commentator, she has conducted >1500 media interviews, including her column for The Conversation; Eating Science; making food and nutrition research digestible.

Colleen Condon

Colleen Condon is an Accredited Practising Dietitian and Accredited Sports Dietitian working in private practice. Her clientele is predominantly members of the Australian Defence Force who must meet fitness and health requirements. Colleen has extensive experience in utilising intermittent fasting for patients requiring weight loss and metabolic health improvements. Colleen also has a role as Health Promotion Clinical Director for Special Olympics Australia.

Ehsan Parvaresh Rizi

Ehsan holds an M.D. in general medicine and a Ph.D. in metabolic medicine from National University of Singapore (NUS). Before joining the Nestle Research Center in Singapore, Ehsan has been co-investigator and collaborator for couple of human studies investigating perturbation in immune-metabolic functions associated with obesity and insulin resistance at National University Hospital (NUH) and NUS. Ehsan also brings in 6 years of experience working in different roles of clinical operation and medical affairs at Novo Nordisk Company, before he moved to Singapore in 2012.

Evan Berk

I am currently the Global R&D Lead for Obesity Care at Nestle Health Science where I am responsible for the development of the innovation pipeline. Previously, I worked at GlaxoSmithKline in various R&D and medical roles in weight control, smoking control, GI Health, sports nutrition, childhood growth and development, and vitamins and minerals. I completed my B.S. in Nutritional Sciences (Cornell University), PhD in Human Nutrition (Columbia University) and Post-Doc at the New York Obesity Research Center. I am an adjunct associate professor at Teacher's College, Columbia University where I have taught nutritional biochemistry for the past 15 years.

Evelyn Parr

Dr Evelyn Parr is a Post-Doctoral Research Fellow in the Centre for Exercise and Nutrition, supported by a grant aiming to delay the development of type 2 diabetes through modifications of circadian rhythms by diet and exercise. Evelyn's PhD research involved an energy-restricted dietary intervention concurrent with exercise training. Under the supervision of Prof John Hawley, her current research involves rescuing the detrimental effects of a poor diet through investigations of exercise and energy intake timing within a day on the development of type 2 diabetes concomitant with obesity.

Graeme Wright

Graeme Wright is the MD of Optimum - a commercial health and management services company in Perth WA. Optimum runs programs for overweight and obese and has done for many years using a combination of VLEDs, hormonal, metabolic and physiological indicators. Graeme has recently completed PhD and is currently working on how metabolic profiles and different caloric regimes may influence weight management and performance.

Hamish Alexander Fernando

Hamish Fernando is a PhD Student at the University of Sydney. Having received his Honours (First Class) from Monash University, he started his PhD under the supervision of Associate Professor Amanda Salis in 2015, after receiving the International Postgraduate Research Scholarship (IPRS). His research strengths include metabolic syndrome and body composition tracking. He is currently working on identifying the direction and magnitude of the error in commonly used body composition scales, and looking for ways to overcome those errors. He is also working on systematic reviews on the effects of Ramadan fasting on weight, body composition and resting metabolic rate.

Harry Freitag Luglio Muhammad

Harry Freitag Luglio is a researcher and lecturer from Faculty of Medicine, Universitas Gadjah Mada, Indonesia. He graduated from Maastricht University, The Netherlands with specialisation on Nutrition and Translation Research in Metabolism (NUTRIM). His research interest is on gene - nutrient interaction on development of obesity and successfulness of a weight loss program. He is currently investigating several factors that associated with the weight rebound phenomena after Ramadhan fasting in overweight and obese individuals (Ramadhan Fasting Yoyo Effect). He is an editor of Indonesian Journal of Clinical Nutrition.

Helen Cheng

Helen is a postdoctoral dietitian and early career researcher at the Academic Department of Adolescent Medicine, University of Sydney. Her research interests are in studying the physical and cognitive changes of puberty that potentially promote obesity, poor diet and increased metabolic risk in teenagers. An appreciation for how puberty impacts nutrition and health will help us develop better weight management interventions for adolescents. Such interventions may include intermittent fasting diets which are popular amongst young people and emerging as an effective, scientifically-sound method of weight loss.

Helen O'Connor

A/Professor Helen O'Connor has a background in nutrition and dietetics and has an interest in weight management in young women with obesity. Her research has investigated the efficacy of higher protein, low GI diets for weight management in young women and the relationship between obesity and cognitive function. She is also researching the impact of body dissatisfaction and internalised weight stigma in weight management therapy for obesity.

Hiba Jebeile

Hiba is an Accredited Practising Dietitian currently undertaking a PhD at the University of Sydney and based at The Children's Hospital at Westmead. Hiba's research aims to develop an evidence base for the feasibility, acceptability and effectiveness of alternate day fasting in adolescents with obesity, and to explore eating behaviours in this population group. Hiba is currently conducting a pilot study on the use of alternate day fasting in adolescents with obesity, and will be involved in a new NHMRC funded randomised controlled trial of modified alternate day fasting in adolescents with obesity.

Jane Overland

Dr Overland is a Nurse Practitioner has worked in chronic disease management for over 30 years. She is responsible for providing clinical management, psychological support and education to a wide range of people with diabetes. She is also a Clinical Associate Professor with The School of Nursing, The University of Sydney. She has recently completed a pilot study examining the metabolic effects and safety of weight loss via intermittent fasting versus standard continuous energy restriction in patients with both Type 1 and Type 2 diabetes and overweight or obesity.

Jane Winter

Jane Winter is Medical Affairs Manager for Nestlé Health Science, Australia. She is an Accredited Practising Dietitian with a PhD from Deakin University.

Joseph Proietto

Joseph Proietto is Professor Emeritus at the University of Melbourne in the Department of Medicine Austin Health and an Endocrinologist specialising in Diabetes and Obesity. He is a widely known investigator on the management of obesity. He established the first public obesity clinic in Victoria at the Royal Melbourne Hospital and is now Head of the Weight control clinic at Austin Health. He is currently on the Executive of World Obesity and is Chair of its Clinical Care Committee.

ATTENDEE BIOGRAPHIES

Kathryn Williams

Kathryn is a Senior Lecturer at the University of Sydney and the Adult Clinical Lead for the newly established Family Obesity Services in the Napean-Blue Mountains Local Health District. She is also a HMVO at Royal Prince Alfred Hospital and a Clinical Investigator at the Boden Institute. She works as an endocrinologist in private practice. She has recently completed a PhD examining the relationship between non-alcoholic fatty liver disease and type 2 diabetes.

Kay Hau Aaron Choy

I am currently an advanced trainee of the Royal Australasian College of Physicians (RACP) in General and Acute Care Medicine, and a senior medical registrar at the University Hospital Geelong in Victoria. I graduated from the University of Adelaide (MBBS) and completed my basic physician training at the University Hospital Geelong. I am a member of the Australia and New Zealand Obesity Society, Endocrine Society of Australia, Diabetes Victoria and European Association for the Study of Diabetes. I have keen interest in diabetes, endocrinology, bariatric medicine and clinical nutrition.

Khalid Alqaisi

Khalid Alqaisi has completed his PhD in 2014 from the Department of Zoology at the University of Otago, New Zealand. His PhD research field was on molecular endocrinology and reproductive physiology. Alqaisi used advanced molecular and biochemical techniques to understand vitellogenesis and steroid hormones synthesis in Echinoderms to understand the evolution of steroidogenic pathway. Khalid also has research experience in the area of developmental neurotoxicity from his Master's research. He has published several papers in peer-reviewed journals. Currently he is interested in studying the neuroendocrine mechanisms that control energy homeostasis and obesity in human.

Krysmaru (Krys) Araujo Torres

I currently serve as the Global Medical Affairs Manager for the Obesity Care Category in Nestle Health Science. Over 6 year experience as Medical Adviser for Diabetes, Obesity and Consumer Care in Nestle Health Science Spain. Previously worked in healthcare private area with CRO's and in public projects planning for Latin American cities and in Venezuela within the public healthcare system. Started my career as a clinical physician. A Venezuelan and Spanish citizen, I hold an MD degree from Universidad de Zulia, Venezuela and a Master's Degree in Public and Social Policy from UPF/IDEC – Johns Hopkins.

Laura Johnson

Laura Johnson is a Lecturer at the University of Bristol. She completed a BSc. in Human Biology (Lboro) followed by a MSc. in Genetic Epidemiology (Sheffield) and a PhD in Nutritional Epidemiology (Cantab). Her research investigates eating architecture (the size, timing and frequency of eating) in relation to cardiometabolic health. Approaches include a systematic review of eating architecture and obesity, type 2 diabetes and cardiovascular disease drawing on prospective observational and randomised trial evidence. She also utilises detailed dietary data from diaries or recalls in large national surveys and cohort studies to understand natural variation in eating architecture worldwide.

Leticia Campos

LC is currently the Senior Project Officer at Nutrition Australia NSW. She is a Dietitian and Registered Nutritionist with Bachelor and Master Degree in Nutrition and Dietetics and more than 10 years' experience in the field. Main areas of professional interest are health promotion, nutrition education, public health nutrition. Main areas of research: Lipids, polyunsaturated fatty acids (PUFA omega-3, omega-6), monounsaturated fatty acid (omega-9), lipid emulsions. LC has published 3 original articles at international journals, 1 review article, 05 articles in magazines for general public and 18 book chapters.

Louise Baur

Louise Baur is the Professor and Head of Child and Adolescent Health at the University of Sydney. She is a consultant paediatrician at The Children's Hospital at Westmead, the largest paediatric facility in Sydney, where she is an active member, and former Head, of Weight Management Services, which provides clinical services for children and adolescents with severe obesity. Louise's research interests cover many aspects of the clinical management and prevention of paediatric obesity. She is the PI of a newly NHMRC-funded, multi-site, RCT of modified alternate day fasting in adolescents with obesity.

Marina Reeves

Marina is an Associate Professor in the School of Public Health, The University of Queensland. She is an Advanced Accredited Practising Dietitian and Head of the Nutrition Unit within the School. Her program of research is focused on the role of weight management, diet and physical activity in improving outcomes for breast cancer survivors. Her research has been funded by grants and fellowships from the National

Health and Medical Research Council and National Breast Cancer Foundation.

Megan Gow

Megan has worked on several diet interventions trials, including an intermittent fasting pilot study, at The Children's Hospital at Westmead aimed at treating children and adolescents with obesity. She has recently completed her PhD which examined the effectiveness of a very low energy diet to treat type 2 diabetes in youth. Megan is also a Chief Investigator of the first RCT in youth, currently in planning stages, to investigate the effectiveness of intermittent fasting to treat obesity in young people.

Melissa Vassallo

Melissa completed her Bachelor Degree in Nutrition and Dietetics (Hons) at the University of Wollongong in 2005. Melissa has been working in the area of diabetes care for the last 7 years and has a passion for assisting clients in making realistic and lasting healthy lifestyle changes. She has also completed a Graduate Certificate in Health Management in 2014 through Curtin University, WA. Outside of work, Melissa loves spending quality time with her family, going out for coffee with friends and playing netball.

Melyssa Roy

Melyssa is trained as a medical doctor, and is currently near completion of her doctoral project examining the effects of an intermittent fasting intervention in a large cohort of 136 overweight adults over a 12-month period. The SWIFT study evaluated the real-world adherence and outcomes resulting from intermittent fasting over the longer term. Melyssa hopes to continue with post-doctoral research in the field of intermittent energy restriction, with other research interests including physical activity interventions such as high-intensity interval training, and alternative dietary approaches such as whole-foods diets. She also maintains an active role in medical teaching at Otago Medical School.

Michelle Headland

Michelle Headland is currently undertaking a PhD in the area of intermittent energy restriction at the University of South Australia. Her research focus is to better understand the effect of intermittent energy restriction on weight loss, long term weight management (including body composition changes), and metabolic factors. She also has a keen interest in the impact of intermittent energy restriction on cardiovascular health, in particular the influence on arterial health. Her research aims to add to the knowledge base of alternate nutrition therapies for obesity and its associated co-morbidities.

Natalie Lister

I am a Research Fellow in Paediatric Nutrition and Obesity/ Pre-Diabetes Treatment at the University of Sydney. I am an Accredited Practising Dietitian with clinical dietetic experience and higher research degree training. As an early career researcher, my research is focussed on reducing cardiovascular risk with dietary interventions. I have several high quality publications in this field. I am CI of a newly NHMRC-funded, multi-site, RCT of modified alternate day fasting in adolescents with obesity.

Neil King

Neil King is the Director of Research Training in the Faculty of Health at Queensland University of Technology, Brisbane. He is an internationally recognised researcher in the field of obesity, physical activity and appetite control. He has achieved an international reputation in obesity research based on developing a research theme of "Resistance to Lose Weight", with a focus on appetite regulation. He has published over 120 peer-reviewed articles and book chapters. He has an h-index of 36, an average of >340 citations/year since 2007. He has supervised 16 PhD and Masters students.

Nerys Astbury

I gained my PhD from the University of Nottingham (UK) in appetite regulation in humans, before embarking on my first postdoctoral position using fMRI to map gut-to-brain signaling mechanisms at the University of Manchester. I subsequently spent 3+ years working in the New York Obesity Nutrition Research Center, Columbia University on several weight loss studies in various populations before returning to the UK in May 2015 to take up my current position at the University of Oxford.

I'm currently a Post-Doctoral Fellow and Trial Manager of the ongoing DROPLET Trial, an RCT of low-energy formula diets as a weight loss treatment in Primary Care.

Peter Clifton

Peter Clifton is a physician with an interest in the treatment of obesity, type 2 diabetes, hyperlipidemia and CVD with diet and exercise.

Rachel Wood

Dr Rachel Wood is a Research Fellow at the University of Tasmania. After completing her PhD in exercise physiology at Queensland University of Technology (QUT) in 2008, Rachel undertook postdoctoral training at QUT and the University of Adelaide, working on projects investigating responses to different models of intermittent energy restriction and intermittent fasting. Since then, Rachel has worked as a lecturer in the School of Exercise and Nutrition Sciences at QUT and as

ATTENDEE BIOGRAPHIES

a Research Fellow at Bond University. Her research focuses on the measurement of acute and chronic metabolic and behavioural responses to alterations in energy balance.

Radhika Seimon

Radhika Seimon completed her PhD at the University of Adelaide in 2012. Her doctorate investigated oral and small intestinal sensitivity to fats in lean and obese humans and implications of energy intake regulation in obesity. Radhika is currently working at the University of Sydney, Boden Institute of Obesity, Nutrition, Exercise & Eating Disorders as an NHMRC Early Career Research Fellow. She is passionate about finding improved dietary therapies for the prevention and management of obesity. Her research focuses on the effects of severe versus moderate dietary energy restriction on appetite regulation and body composition.

Rinki Murphy

Rinki is a Diabetes physician and Associate Professor in Medicine, at University of Auckland. She completed her endocrinology training in Auckland in 1999 followed by a PhD in the genetics of diabetes at the University of Plymouth and Exeter, UK in 2007. Her research is in genetics and physiology of diabetes and obesity, which includes the PROFAST study ACTRN12616001050448 recruiting now.

Samuel Stevens

I am a junior doctor from Sydney with a strong interest in metabolic health and preventative medicine. I have previously studied exercise and sports science, and my research interests include the immunobiology of obesity. I hope to explore my interest in endocrinology as I undertake basic physician training.

Sarah Garnett

Sarah is a Senior Research Fellow/Dietitian in the Institute of Endocrinology and Diabetes at the Children's Hospital at Westmead and a conjoint A/Professor, Discipline of Child and Adolescent Health at the CHW, Clinical School, University of Sydney. She has extensive experience in designing, implementing and leading multi-disciplinary and multi-site epidemiological studies and clinical trials including RCTs examining the effects of different diets on weight loss and insulin sensitivity in adolescents. Sarah is currently a CI on an NHMRC funded project comparing intermittent fasting with daily energy restriction in adolescent with obesity.

Sarah-Jane Leigh

First year behavioural neuroscience doctoral candidate at UNSW with a particular interest in the molecular basis of cognitive impairment observed in obesity. Our lab is interested in the contribution of macronutrients and dietary cycling in the development and exacerbation of cognitive dysfunction in animal models of obesity.

Sharayah Carter

Sharayah Carter is an Accredited Practising Dietitian, working in chronic disease management with nine years consulting experience. She is currently undertaking a PhD with the University of South Australia, investigating the effects of intermittent energy restriction compared to continuous energy restriction in people with Type 2 Diabetes. Her research will explore the effects of intermittent energy restriction on weight loss and blood glucose control with the intent to establish effective medication management guidelines. She recently published results of a 3-month pilot trial investigation and is currently exploring effects over 12 and 24 months.

Shirley Alexander

Paediatric Staff Specialist and Head of Weight Management Services at the Children's Hospital at Westmead. Interests include alternate day fasting and VLED from a clinical perspective with the aim to improve engagement of young adolescents with obesity to adhere to weight loss interventions.

Suriani Ismail

Dr Suriani Ismail is a lecturer in health promotion at Department of Community Health, Faculty of Medicine and Health Sciences, UPM. She obtained her medical degree (MD) from Universiti Sains Malaysia (USM), Master of Public Health (MPH) from Universiti Malaya (UM) and Doctor of Philosophy (PhD) from Universiti Kebangsaan Malaysia (UKM). She has 20 years' experience in the field of public health-having served in government agencies and academics. Her research and interests focus mainly in the field of health promotion.

Tania Markovic

Tania Markovic (MBBS PhD) is the Director of the Metabolism & Obesity Services and a senior staff specialist in the department of endocrinology at the Royal Prince Alfred Hospital in Sydney. She is a clinical associate professor at the Boden Institute of Obesity, Nutrition, Exercise & Eating Disorders, University of Sydney. For the last 2 decades her clinical and academic work has revolved around the understanding and management of obesity. As the director of a large multidisciplinary weight

management clinic at a tertiary referral centre she has been involved in all aspects of the care of patients with complex obesity.

Theodore Angelopoulos

Dr. Angelopoulos is Professor and Director of Research in the School of Health Sciences and Director of the Obesity Research Center at Emory & Henry College in Virginia. Dr. Angelopoulos is an alternate panelist in the European Food Safety Authority (2015-2018), member of the Scientific Review Committee of the Obesity Society (TOS; 2015-2018)

Tim Nagy

Dr. Nagy obtained his PhD from the University of Utah and conducted postdoctoral research at the University of Delaware and the University of Alabama at Birmingham (UAB). He is a professor in the department of nutrition sciences at UAB, where he directs the small animal phenotyping core for the UAB Nutrition Obesity Research Center, the Diabetes Research Center, and the Shock Center for Aging. Dr. Nagy's research is focused on two areas: (1) the development and validation of methods for phenotyping small animals, and (2) the link between body composition, energy balance and disease.

Tri Cao

Dr Tri Cao, MBBS, FRACGP, SCOPE- World Obesity Federation, is a GP with special interest in Lifestyle Medicine and Obesity Management. She leads a regular 8-week weight loss program using multidisciplinary approach in group sessions, at Montague Farm Medical Centre since 2011 and Noarlunga GP plus super clinic since January 2014. She creates a program to help GPs writing a meal plan for patient in a standard 15-minute consult. Dr. Cao actively participates in obesity research and education.

Yeon Ji Lee

Associate Professor in the Department of Family Medicine, Obesity center, Inha Univ. Hospital, School of Medicine, Inha University

Visiting Scholar in the Boden Institute of Obesity, Nutrition, Exercise & Eating disorders, University of Sydney.

Secretary of Committee of Training in Korean Society for the Study of Obesity

Member of Committee of Education & Training in Korean Society for Metabolic and Bariatric Surgery

Zoe Thomson

Zoe Thomson is a PhD candidate at the University of Queensland's School of Public Health. She has a Masters in Dietetics from the University of Queensland and is an Accredited Practising Dietitian. Her masters work systematically reviewed weight gain prevention trials conducted in women diagnosed with breast cancer. She has continued with this field of research into her PhD, focusing on delivering an intermittent energy restriction intervention to premenopausal breast cancer survivors.



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