C-PAN

Centre for Physical Activity and Nutrition Research

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OBESITY – DOING NOTHING IS NOT AN OPTION

Australia now ranks fifth in the world for obesity. Latest evidence from the 2011–12 Australian Bureau of Statistics Australian Health Survey indicates 35% of adults are overweight, with a further 28% considered to be obese. The situation amongst children is also disturbing with almost one in five (18%) overweight, and a further 7% obese.

Over recent years the focus on the importance of obesity as a public health issue appears to have waned, with funding for preventative health initiatives drying up and the National Preventive Health Agency, which had a focus on obesity prevention, being dismantled.

We need a concerted effort now to address the obesity epidemic. There is no simple solution as obesity is a complex issue. But it's not good enough to do nothing. Without action, the health of individuals will continue to suffer and the costs to the community and Australia's future will be huge.

SAVE THE DATES

Population Dietary Change Seminar, Wednesday afternoon 14 October 2015

C-PAN as a member of the Centre for Obesity Management, Prevention and Research Excellence in Primary Health Care (COMPaRE-PHC) will host a free seminar featuring Professor Susan Jebb, Professor of Diet and Population Health, University of Oxford. Professor Jebb will present on options for population-level dietary change, with an emphasis on obesity. Details available on the C-PAN website closer to the date.

Research Degree Symposium, Friday 18 September

Deakin University's School of Exercise and Nutrition Sciences will host the 11th Research Degree Symposium, featuring latest research from our research students. Register at: **www.eventbrite.com/e/deakin-university-sens-phd-research-symposium-2015-tickets-17255915909**

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IRON NUTRITION IN VULNERABLE POPULATION GROUPS IN AUSTRALIA

Iron deficiency is the most common nutrient deficiency and a major public health problem worldwide. Young children and women of childbearing age are at particular risk as their dietary iron intakes are often insufficient to support increased physiological requirements during rapid growth in children, and during menstruation and pregnancy in women. Iron is important for brain growth and iron deficiency anaemia in early childhood has been associated with long-lasting and irreversible cognitive and behavioural delays. In adults, iron deficiency, even in the absence of anaemia, has been associated with increased fatigue, depression, and poorer cognitive function, while maternal anaemia during pregnancy has been associated with poorer maternal and infant outcomes. By compromising both physical and intellectual capacity in children and women, iron deficiency markedly undermines a country's productivity.

To design effective strategies for the prevention and treatment of iron deficiency, it is crucial to understand the specific factors that underlie low iron intakes and iron deficiency in these at-risk population groups, such as inappropriate dietary patterns or low iron bioavailability. This information is currently lacking in Australia.

Through our research we will determine the prevalence of inadequate iron intakes and iron deficiency in Australian children under 5 years of age and women of childbearing age, factors predisposing these vulnerable groups to low iron intakes and iron deficiency, and dietary patterns associated with iron intakes and status.

We are also working to assess the impact of iron deficiency in Australian women on productivity and mental health and well-being, and the impact of iron intakes in early childhood on school readiness.

References

1. Domellöf M, Szymlek-Gay EA. Iron nutrition and neurodevelopment in young children. In: Riby L, Smith M, Foster J, editors. *Nutrition and Mental Performance: A Lifespan Perspective*: Palgrave Macmillan; 2012.
2. Lomagno K, Hu F, Riddell L, Booth A, Szymlek-Gay EA, Nowson C, et al. Increasing iron and zinc in pre-menopausal women and its effects on mood and cognition: a systematic review. *Nutrients* 2014; 6: 5117-41.

Key messages

Iron deficiency is a major public health problem worldwide with young children and women of childbearing age amongst the most vulnerable.

Iron deficiency anaemia in early childhood has been associated with long-lasting and irreversible cognitive and developmental delays. In women, it has been associated with increased fatigue, depression, impaired cognitive function, and poorer pregnancy outcomes.

C-PAN's research is aiming to understand factors associated with inadequate iron intakes and iron deficiency in young children and women which may help to design effective strategies for its prevention and treatment.

Funding acknowledgement

Dr Szymlek Gay is supported by a Deakin University Alfred Deakin Postdoctoral Research Fellowship.

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IMPROVING MUSCLE FUNCTION IN MUSCULAR DYSTROPHY

Duchenne Muscular Dystrophy (DMD) is the most common form of muscular dystrophy occurring almost always in boys. At present there is no cure for DMD and current treatment options come with significant side-effects. Therefore the development of alternative treatment options is of extreme importance. As DMD is characterised by increased contraction-induced muscle damage and reduced regenerative capacity, treatment strategies that improve these factors will significantly improve the health and quality of life for boys with DMD.

The striated muscle activator of Rho signalling (STARS) protein is a muscle-specific actin binding protein that can protect the sarcomere from damage, activate growth promoting signalling pathways and increase smooth and skeletal muscle cell proliferation. We have observed that STARS protein is less abundant in skeletal muscle from patients with DMD, as well as in skeletal muscle from two mouse models of human DMD. We have also shown that when we artificially reduce the amount of the STARS protein in muscle cells there is a reduced regenerative capacity. Increasing the levels of the STARS protein in dystrophic mice decreases inflammatory markers including IL-1ß, IL-6, TNFa mRNA and MCP1. We therefore hypothesise that increasing the levels of the STARS protein will improve skeletal muscle health by reducing muscle fibre inflammation, degeneration and contraction-induced muscle damage. We also hypothesise that there will be improved regenerative capacity and muscle force production.

This "proof of concept" project has the potential to identify the STARS protein as a novel therapeutic target to improve skeletal muscle function in DMD and therefore will be of immediate interest to researchers in the field of DMD as well as other muscular dystrophies. Additionally, the outcomes will be of relevance to other conditions such as age-related muscle wasting (sarcopenia) and in chronic diseases associated with muscle wasting such as cancer cachexia, heart disease, chronic obstructive pulmonary disease and HIV/AIDS.

Key messages

Duchenne Muscular Dystrophy (DMD) has no cure and current treatments have significant side-effects. Alternative treatments are needed.

The striated muscle activator of Rho signalling (STARS) protein may provide a novel therapeutic target to improve skeletal muscle function in DMD.

Funding acknowledgement

The French Muscular Dystrophy Association (AFM-Téléthon).

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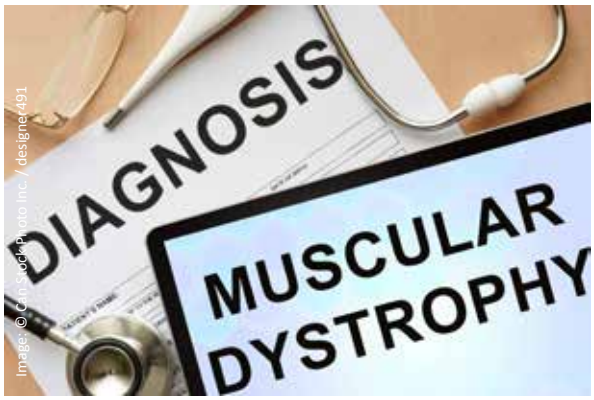

UNDERSTANDING EATING BEHAVIOURS: CONSIDERING THE IMPORTANCE OF MEAL PATTERNS

The Australian Dietary Guidelines provide advice on the amounts and types of foods to consume each day and each week. However, currently, they do not provide guidance on other aspects of eating behaviour such as how foods are actually eaten as meals. Examining food intakes at the level of a meal provides evidence on the way people actually consume foods, and has the potential to lead to evidence for the development of messages and strategies promoting simple and feasible changes to food habits in the population. Meal patterns is a concept encompassing timing, frequency, spacing and sequencing of meals or eating occasions throughout the day. A further component of meal patterns is the social context or the situational factors that accompany the meal, such as the eating location, presence of others and what activities were occurring while eating.

We are currently examining meal patterns in the Australian population via a three phase project funded by the Australian Research Council. Firstly we are examining meal patterns in the Australian population, and changes during the past two decades using data from national nutrition surveys, including the most recent National Health Survey. Secondly, we are using qualitative research methods to examine young adults' meal patterns and identify characteristics and potential predictors of meals and meal patterns. Finally we are conducting a quantitative survey of 800 young adults aged 18-30 years to assess meal patterns using a Smartphone meals diary to examine the determinants of meal patterns in young adults. Young adults are a major focus for this work as they are a major risk group for weight gain and eat particularly poor diets. Young adults frequently report time constraints as a major barrier to healthy eating which may influence meal structure including preparation and content of meals.

This program of work will provide unique insight into the meal pattern behaviours of Australians including how foods are consumed together in particular meals or eating occasions, the context surrounding meal patterns, or the correlates or determinants of meal patterns. A better understanding of meal pattern behaviours will assist us to develop healthy eating messages, which will complement current dietary advice and guidelines.

Reference

1. Leech RM, Worsley A, Timperio A, McNaughton SA. Understanding meal patterns: definitions, methodology and impact on nutrient intake and diet quality. *Nutrition Research Reviews* 2015; Mar 19: 1-21. [Epub ahead of print].

Key messages

Little is known about the meal patterns of Australians despite their association with diet quality and health outcomes.

This research will provide new information which will facilitate the design of more effective ways to communicate with consumers about healthy eating.

Funding acknowledgement

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ASSOCIATIONS BETWEEN SEDENTARY BEHAVIOUR AND BODY COMPOSITION AND SARCOPENIA IN OLDER ADULTS

There is a lot of research demonstrating the link between sedentary behaviour and a number of cardiometabolic disorders and mortality, but less is known on the relationship between sedentariness and musculoskeletal health and functional performance in older adults and the elderly. The influence of sedentary behaviour on sarcopenia (the age-associated marked loss of muscle mass, strength and function) is of particular interest due to its association with increased risk of falls, disability, loss of independence and mortality.

We recently published a study of 162 community-dwelling men and women aged 60 to 86 years, investigating the association between self-reported total sitting and TV viewing time, and sarcopenia and its determinants (muscle mass, strength and function) in older adults. Total body and regional fat mass and lean mass (LM) were assessed using Dual-Energy X-ray Absorptiometry, muscle strength was assessed using three repetition maximum leg press muscle testing, and the 'Timed-Up-and-Go Test' with a secondary cognitive task was used to assess gait speed.

Sarcopenia was defined as the lowest sex-specific quartile for relative appendicular LM plus muscle strength and/or gait speed. In this study, greater overall sitting time was associated with an increased risk of sarcopenia; for each 1-hour increment, the risk increased by 33%, independent of physical activity and other lifestyle and confounding factors. Further examination of the association between sedentary behaviours and each of these components revealed that a higher amount of daily TV viewing time was associated with lower total body and leg LM, but only after adjusting for fat mass, which suggests that increased adiposity may be mediating this association. There were no associations between total sitting or TV viewing time with any other measure.

Further research is needed to fully understand the influence of sedentary behaviours on sarcopenia and whether reducing sitting time reduces the risk of sarcopenia. However, this study suggests that it is important for older adults to reduce their daily sitting time to limit age related muscle loss and deterioration.

Reference

1. Gianoudis J, Bailey C, Daly R. Associations between sedentary behaviour and body composition, muscle function and sarcopenia in community-dwelling older adults. *Osteoporosis International* 2015; 26(2): 571-579.

Key messages

Each 1-hour increment in overall daily sitting time was associated with a 33% increased risk of having sarcopenia.

Higher volumes of TV viewing time were associated with lower total body and leg lean mass, but only after adjusting for fat mass.

Older adults should be encouraged to reduce the amount of time spent sitting to limit age-related muscle loss and deterioration.

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NEWS AND EVENTS

NEW NUTRITION AND PHYSICAL ACTIVITY RESEARCH FACILITY

C-PAN staff now have a fabulous new facility at our Deakin University Burwood Campus which further strengthens our research capacity. The new facility was opened by Professor Lee Astheimer, Deputy Vice-Chancellor (Research).

The facility includes:
- A dedicated area for research involving infusion of various metabolic tracers in combination with muscle and blood sampling,
- A gym to examine the health benefits of progressive resistance (strength) training alone or in combination with aerobic exercise, high velocity functional power training, challenging balance activities and exercise combined with blood flow restriction,
- Access to DEXA and pQCT machines to accurately quantify the effects of different types and doses of exercise alone, or in combination with various dietary factors on changes in bone mass, structure and strength as well as body composition (fat and muscle mass), transcranial magnetic stimulation (TMS) and electroencephalography (EEG) to accurately measure changes in brain function, and electrocardiogram (ECG) to measure heart rate and heart rate variability, and
- Rooms to undertake interviews and focus groups with research participants.

NEW ISBNPA PRESIDENT

Alfred Deakin Professor Jo Salmon is the new President of the International Society of Behavioral Nutrition and Physical Activity (ISBNPA; 2015-17). ISBNPA has been operational since 2001. Its mission is to "stimulate, promote and advocate innovative research and policy in the area of behavioral nutrition and physical activity toward the betterment of human health worldwide". During her term Jo will look to attract members from regions with low representation (e.g. Asia, South America) and increase the presence of practitioners and policy makers in the Society. She will also be exploring opportunities for ISBNPA to form a coalition of like-minded societies to strengthen advocacy potential and to increase learning from other disciplines and content areas. To become a member of ISBNPA, visit www.isbnpa.org.

GRANT SUCCESS

- C-PAN's Associate Professor Daniel Belavy is part of an international team awarded 732,451.73 EUR from the German AeroSpace Center to investigate musculoskeletal adaptations to disuse and exercise. Grant number 50WB1521.

RESEARCH DISSEMINATION AND LEARNINGS

Over recent months a number of C-PAN staff have presented at major international conferences and spent time at overseas institutions.

- Alfred Deakin Professor Kylie Ball gave an invited keynote presentation at the International Society of Behavioral Nutrition and Physical Activity in Edinburgh. Kylie's presentation was titled 'Traversing myths and mountains: Addressing socioeconomic inequalities in the promotion of nutrition and physical activity behaviours'.

- From May to July, Alfred Deakin Professor Jo Salmon was overseas on Academic Study Leave visiting with Professor Nanette Mutrie, Director of the Physical Activity and Health Research Centre (PAHRC), in the Institute for Sport, Physical Education & Health Sciences (ISPEHS) at the University of Edinburgh. Opportunities to collaborate and share research intelligence were explored, including adaptation of the EU-funded Eurofit Project (http://eurofitfp7.eu/) for Australian sports fans and testing the implementation of C-PAN's Transform-Us! intervention in Scottish schools. Jo also visited with Professor John Reilly and his team at the University of Strathclyde in Glasgow and gave an invited presentation on C-PAN's research to members of the English National Health Service. During her time overseas Jo attended and presented at the International Society of Behavioral Nutrition and Physical Activity conference in Edinburgh, the Determinants of Sedentary Behaviour satellite meeting in Glasgow and the International Conference on Ambulatory Monitoring and Physical Activity Measurement in Limerick.

- Dr Lukar Thornton spent time with Professor Jamie Pearce at the University of Edinburgh and colleagues working within the Centre for Research on Environment Society and Health (CRESH), met with researchers from the Scottish Collaboration for Public Health Research & Policy (SCPHRP) and presented at the International Society of Behavioral Nutrition and Physical Activity conference.

- Associate Professor Daniel Belavy gave an invited presentation at the German Sports University Cologne on 'The intervertebral disc in sport, exercise and unloading'.

- Dr Sharleen O'Reilly recently participated in two different knowledge translation events in Canada. The first event was the invitation-only knowledge utilisation colloquia for international leaders in knowledge translation in Ottawa. The gathering provided a forum to discuss contentious issues and hot topics in knowledge translation alongside networking opportunities. The second event was the Knowledge Translation Summer Institute held in Edmonton, Alberta. This sought-after training event receives six times the applications for places available. The four-day course focused on growing knowledge translation skills in all participants.

Professor Mark Lawrence has been invited to present at a plenary session of the 2015 Cochrane Colloquium in Vienna in October. His talk will focus on the 'science and politics of using evidence in nutrition policy'. Mark will also be co-chairing and presenting at the 1-day nutrition symposium at the Cochrane Colloquium. The symposium will be attended by representatives from leading UN agencies, philanthropists and academic institutions involved in global and nutrition policy.

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Our mission
To conduct high quality, multidisciplinary nutrition and physical activity research to actively inform policy and practice to improve health, and build capacity in nutrition and physical activity research in Australia.