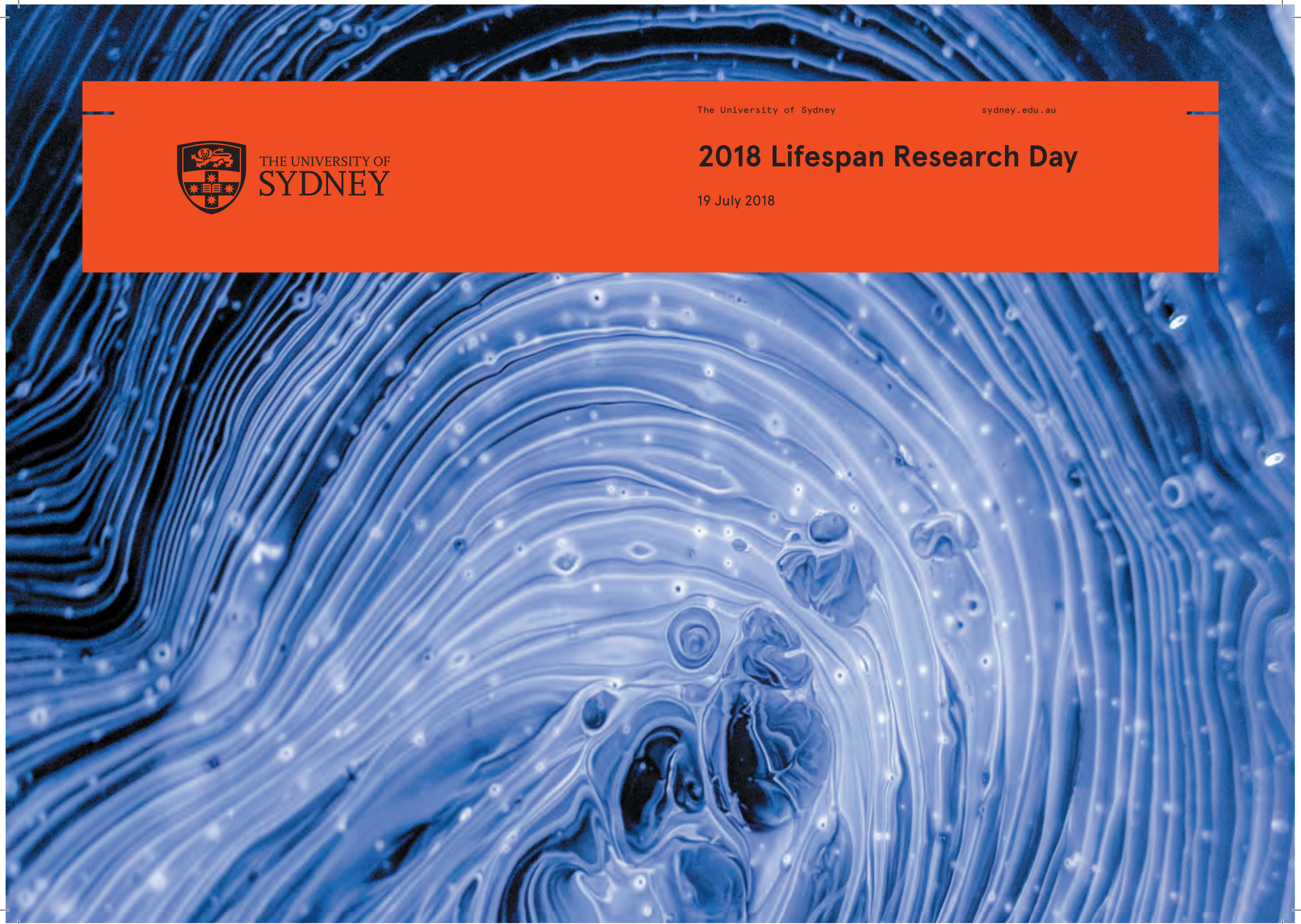

THE UNIVERSITY OF SYDNEY

2018 Lifespan Research Day

19 July 2018

2018 Lifespan Research Day

Organising committee

Lifespan Emerging Researchers Committee members:

Dr Rahena Akhter	Discipline of Cariology, Sydney Dental School
Dr Tonia Crawford	Sydney Nursing School
Dr Alison Hey-Cunningham	Central Clinical School
Associate Professor Steve Kamper	Sydney School of Public Health
Dr Nathalie Kizirian	Charles Perkins Centre
Dr Natalie Lister	Discipline of Child and Adolescent Health, Children's Hospital at Westmead Clinical School
Dr Yorgi Mavros	Physical Activity, Lifestyle, Ageing and Wellbeing Group, Faculty of Health Sciences
Dr Seema Mihrshahi	Sydney School of Public Health
Dr Shekeeb Mohammad	Children's Hospital at Westmead Clinical School
Dr Helen Parker	Discipline of Exercise and Sport Science, Faculty of Health Sciences
Dr Jonathan Penm	Sydney Pharmacy School
Dr Melinda Phang	BIONE: Boden Institute Obesity Nutrition & Exercise, Sydney Medical School
Ms Susie Redfern	Office of Research and Research Training, Sydney Medical School
Dr Anne Tiedemann	Musculoskeletal Health Sydney, Sydney School of Public Health

Welcome message from the Lifespan Research Network co-leaders

On behalf of the Lifespan Research Network, we welcome you to the 2018 Lifespan Research Day. We especially welcome our keynote speakers Associate Professor Kirsten Black, Associate Professor Jennifer Fraser and Associate Professor Rebekah Moles.

Lifespan Research Day is a highlight of our community's calendar, providing an opportunity to learn about recent research achievements and current projects that showcase the Lifespan theme.

We will hear about projects that seek to increase understanding of significant life stage transitions and investigate determinants of trajectory effects from one developmental life stage to the next. Our speakers will discuss research that sheds light on under-researched life stages and disadvantaged populations, and we'll learn about research findings that not only contribute to discipline knowledge but have the potential for important health impact when translated.

We will also present the 2018 Lifespan Collaboration Award. Our finalists are on our program today as oral presentations of original work. The Lifespan Collaboration award recognises outstanding multidisciplinary, cross-faculty and/or international collaboration in Lifespan research.

We hope that you enjoy the program, meet new people with similar professional interests, and leave with some bright ideas for future collaborations.

Professor Richard Lindley and Professor Kate Steinbeck
Co-leaders, Lifespan Research Network

About the Lifespan Research Network

The Lifespan Research Network is a diverse community of researchers from the University of Sydney who are devoted to the study of human health and development across the stages of life.

Since it began in 2014, the Lifespan Research Network has grown to include members from across the University's schools and faculties, and many of the affiliated centres and institutes. The 2018 Research Day program reflects the diversity of the Lifespan community, and highlights the broad reach and relevance of the Lifespan theme within health and medical disciplines and beyond.

In 2018, the Lifespan Research Network is presenting a number of awards and funding opportunities, including the Lifespan Collaboration Award and People's Choice Award for 'Best Presentation of the Day', which will both be presented at the end of this meeting.

Membership of the Network is free and open to all clinical and health services and basic science researchers from The University of Sydney and affiliated centres and institutes.

For further information, please contact the Lifespan Research Network Office
+ 61 2 9351 1915
lifespan@sydney.edu.au
sydney.edu.au/lifespan-research-network

Program
2018 Lifespan Research Day

9.00am	**Registration**
9.25am	**Welcome** Professor Kate Steinbeck Lifespan Research Network co-leader
Session 1: Transitions and Trajectories	
9.40am	**Chair: Associate Professor Steven Kamper, Sydney School of Public Health**
9.45am	**K01: Associate Professor Kirsten Black** **Discipline of Obstetrics, Gynaecology and Neonatology, Central Clinical School** Interpregnancy intervals less than 12 months: advice given, contraception used and notions of ideal timing
10.20am	**P01: Dr Helen Cheng** **Discipline of Child and Adolescent Health, Sydney Medical School** Life in the puberty fast lane: a systematic review on the relationship of puberty tempo to adolescent health and development
10.35am	**P02: Anagha Kelledar** **Sydney School of Public Health** Investigating inequalities in obesity-associated quality of life from childhood to adolescence in Australia
10.50am	**P03: Dr Maria Parvaneh** **Discipline of Life Science, School of Dentistry and Charles Perkins Centre** Periodontitis induces endothelial dysfunction in mice
11.10am	**Morning Tea**
Session 2: Translation	
11.40am	**Chair: Dr Helen Parker - Discipline of Exercise and Sport Science, Faculty of Health Sciences**
11.45am	**K02: Associate Professor Jennifer Fraser** **Susan Wakil School of Nursing and Midwifery** Translating research into acute paediatric care settings: streamlining sustainable child protection practices into routine paediatric emergency care
12.20pm	**P04: Dr Simon Poon** **School of Information Technologies** Derivation and analysis of latent handwriting features as clinical markers of Parkinson's Disease

12.35pm	**P05: Ilaria Pozzato** **John Walsh Centre for Rehabilitation Research, Northern Clinical School,** **Kolling Institute of Medical Research** The 'heart' of the matter: biomarkers of autonomic balance for predicting mental disorder and recovery following road traffic injuries
12.50pm	**P06: Dr Helen McGuire** **Discipline of Pathology, School of Medical Sciences, Sydney Medical School** Understanding health and disease through immune monitoring
1.05pm	**Lunch**
Session 3: Life Stages	
2.05pm	**Chair: Dr Natalie Lister – Discipline of Child and Adolescent Health,** **Children's Hospital at Westmead Clinical School**
2.10pm	**K03: Associate Professor Rebekah Moles** **Sydney Pharmacy School** SetDose: development of a Smart Syringe System
2.45pm	**P07: Fiona Robards** **Discipline of General Practice, Sydney Medical School** Policy solutions for improving marginalised young people's health literacy and health system navigation
3.00pm	**P08: Shannon Mostyn** **Discipline of Pharmacology, School of Medical Sciences** Development of N-acyl amino acids that selectively inhibit the glycine transporter, GlyT2, for the treatment of chronic neuropathic pain
3.15pm	**P09: Trang Tran** **Northern Clinical School and Kolling Institute of Medical Research** Effect of long-term polypharmacy and the Drug Burden Index (DBI) on cardiovascular function and cardiac fibrosis in aged mice
3.30pm	**Afternoon Tea**
Presentations	
4.10pm	**2018 Lifespan Research Collaboration Award** **2018 People's Choice Award for Best Presentation of the Day**Closing remarks: Professor Richard Lindley, Lifespan Research Network co-leader
4.30pm	**Close**

Invited speakers

Associate Professor Kirsten Black

Associate Professor Kirsten Black is an academic gynaecologist at the University of Sydney where she is the Joint Head of the Discipline of Obstetrics, Gynaecology, and Neonatology. She has a clinical, teaching and research interest in sexual and reproductive health (SRH) and chairs the Royal Australian College of Obstetricians and Gynaecologists' Special Interest Group this field. Associate Professor Black leads a contraception service at a tertiary referral hospital and undertakes epidemiological and clinical studies in reproductive health in Australia and Asia Pacific. She leads an international maternal adolescent and reproductive health research group and supervises students undertaking research in the Asia Pacific region. In 2018, she launched the new Masters in Sexual and Reproductive Health.

Associate Professor Jennifer Fraser

Associate Professor Jennifer Fraser has a clinical background in paediatric and child health nursing and is appointed at the Susan Wakil School of Nursing and Midwifery and at the Sydney Children's Hospitals Network. She leads research to advance paediatric and child health care through a program that supports the relationship between research, policy and practice in paediatric and child health nursing. Her research activities range from testing strategies for early intervention and prevention of child abuse and neglect to identifying and responding to child abuse injury presentations in paediatric emergency settings. Her work has contributed to ongoing implementation of nurse home visiting programs throughout Australia and more recently to developing paediatric workforce capacity in child protection in Australia and internationally.

Jennifer is lead author of two Australian paediatric nursing textbooks for undergraduate and new graduate nurses. She is currently funded to conduct translational research at the Sydney Children's Hospitals Network in Sydney, Mid North Coast LHD and at the Lady Cilento Children's Hospital in Queensland. In recent years, she has taken her research and teaching expertise to Vietnam and Brazil and publishes with her collaborators in these countries.

Associate Professor Rebekah Moles

Associate Professor Rebekah Moles from The University of Sydney's Pharmacy School is passionate about Quality Use of Medicines in Paediatrics. A Fellow of both the International Pharmaceutical Federation (FIP) and the Society of Hospital Pharmacists of Australia, Rebekah has received two prestigious awards including the Pharmaceutical Society of Australia's Young Pharmacist of the Year (2003), and the FIP Young Scientist Award for Professional Innovation (2006). With over 200 publications, Rebekah has a track record in practice-based research addressing real-world problems. She is excited to lead a multidisciplinary collaboration to develop innovative technologies to end paediatric dose errors.

Abstracts

K01 Interpregnancy intervals less than 12 months: advice given, contraception used and notions of ideal timing

Kirsten Black

Discipline of Obstetrics, Gynaecology and Neonatology, Central Clinical School

Objectives: The time between one pregnancy and the conception of the next is the interpregnancy interval (IPI). Short intervals of less than 6 months are consistently found to be associated with a range of adverse maternal and neonatal outcomes including maternal anaemia, preterm birth and low birthweight and those less 12 months increase the risk of neonatal morbidity. Amongst women attending two maternity hospitals in Sydney Australia, we sought a random sample of women to examine the timing of their IPIs and their understanding about the optimal space between pregnancies.

Methods: A prospective questionnaire-based study was performed at two hospitals in Sydney, Australia between Sep 2016 and May 2017. We collected demographic data, previous obstetric history, interpregnancy interval, contraceptive use and perspectives on advice and timing of the current pregnancy and ideal birth spacing from consenting women attending their second antenatal visit or immediately postnatal.

Results: 316 women completed questionnaires of whom 195 women were pregnant following a live birth. Of these, 119 (61%) reported that neither the hospital nor their GP had provided advice about ideal IPIs, 46.2% had not used contraception between pregnancies and 38 (19.5%) had an IPI < 12 months. Compared to women who had an IPI of > 12 months, significantly fewer women with an IPI of <12 months had used contraception after the last birth (21.6% versus 59.9%; p<0.001) and significantly more believed that <12 months was an ideal birth interval (73.9 versus 44.5%; p=0.031).

Conclusion: Most women who completed a questionnaire following a live birth reported a lack of health provider information about ideal IPIs. Where optimal IPI was understood to be less than a year, women were more likely to have a short interval between pregnancies. Almost half of women did not use any contraception.

P01 Life in the puberty fast lane: a systematic review on the relationship of puberty tempo to adolescent health and development

Hoi Lun Cheng[1,2], Stella R Harris[1], Myuran Sritharan[1], Matthew J Behan[3], Sharon D Medlow[1,2], Katharine S Steinbeck[1,2]

[1] Sydney Medical School, Discipline of Child and Adolescent Health
[2] The Children's Hospital at Westmead, Academic Department of Adolescent Medicine
[3] School of Rural Health, Orange

Background: Puberty has a profound and lasting impact on human health. The negative health consequences of earlier timing of puberty onset has been recognized for more than half a century. Yet, research on the impact of puberty tempo (speed of puberty) is emerging and its influence on various aspects of health and wellbeing remains unclear.

Aim: To systematically review and summarize all published research on pubertal tempo and its relationship to health, wellbeing and behaviour.

Methods: The online databases MEDLINE, PREMEDLINE, Embase, PsycINFO, CINAHL and the Cochrane library were searched from earliest record to December 2017. Longitudinal studies were included if these: enrolled healthy girls and/or boys aged 8-21y; measured tempo via ≥2 serial and validated measures of pubertal status; and related tempo to a health outcome. Data extraction included measurement methodologies for and any health outcome(s) associated with puberty tempo. Outcomes were grouped into five categories: pubertal timing; height; adiposity; psychosocial outcomes; and hormones.

Results: The initial search netted 18,801 records, 30 of which were included for final review. The included studies varied widely in the measurement and interpretation of pubertal tempo. Overall, faster tempo was most consistently associated with later pubertal onset and menarche in girls (7/13 studies), and less optimal mood and behavioural outcomes in boys (6/9 studies). In both sexes, faster tempo was also frequently associated with greater childhood and adolescent adiposity (6/8 studies), and higher puberty/growth-related hormone levels (3/3 studies).

Conclusions: Pubertal tempo shows associations with physical and psychosocial health, some of which appear to be sex-specific. Without a standardised definition for tempo, the importance of these conclusions is uncertain. Clinically, it would be reasonable to consider monitoring and addressing mood and behaviour in faster maturing boys, and intervening to avoid excess adiposity gains in rapid maturers of both sexes.

P02 Investigating inequalities in obesity-associated quality of life from childhood to adolescence in Australia

Anagha Killedar[1], Thomas Lung[2], Alison Hayes[1]

[1] Sydney School of Public Health
[2] The George Institute for Global Health, University of New South Wales

Background: High body mass index is the second highest contributor to disease burden in Australia and 25% of the child population are overweight or obese. Not only is there an overall high burden of childhood overweight and obesity in Australia, but there are distinct socioeconomic inequities in its distribution. One of the immediate poor outcomes of obesity in childhood is poor quality of life, although the presentation of this association in different socioeconomic groups, and from childhood to adolescence, is not well established. Aim: To investigate obesity-associated inequalities in quality of life from the ages 5 to 15 in the Australian population.

Methods: Data from the Longitudinal Study of Australian Children (LSAC), which follows children from a nationally representative cohort every two years from ages 5-15 were used. This dataset contains a measurement of health-related quality of life (PedsQL), BMI, and demographic information including age, sex and socioeconomic status. Using a cohort of 4198 children, mean PedsQL stratified by sex, weight status and socioeconomic status was calculated for each wave of measurements to elucidate the relationships between these characteristics.

Results: From ages 5 to 15, mean quality of life remains at similar levels for children of normal weight in both boys and girls, while there is a slight decrease over time for overweight children and a more substantial decrease in obese children. Socioeconomic inequalities in quality of life worsen in this time frame, particularly in obese boys, and overweight and obese girls. Furthermore, the association between weight status and quality of life becomes stronger over time in the low socioeconomic group but not in the high socioeconomic group.

Conclusion: These results demonstrate that inequalities in childhood obesity extend to the association between weight status and quality of life and these inequalities worsen from childhood to adolescence.

P03 Periodontitis induces endothelial dysfunction in mice

Maria Parvaneh[1], Tala Moradi[1], Jacqueline Ku[2], Joerg Eberhard[1], Kim Bell-Anderson[3], Paul Witting[4], Shane Thomas[2]

[1] Discipline of Life Science, School of Dentistry, Charles Perkin Centre
[2] School of Medical Sciences, University of New South Wales
[3] School of Life and Environmental Sciences, Charles Perkin Centre
[4] Discipline of Pathology, School of Medical Sciences

Background: Cardiovascular disease is one of the main public health problems in the world. Recent findings suggest that local inflammation in the gums (periodontitis) might increase plaque formation within blood vessels leading to heart attack orstroke.

Aim: The aim of this study is to establish a murine model of periodontitis to delineate the link between local periodontal inflammation and aortic endothelial dysfunction as an early sign of atherosclerosis.

Methods: 24 male 8-week ApoE mice were divided into 2 groups. G1: non-periodontitis and G2: periodontitis groups. Periodontitis was induced by oral inoculation of 0.4 ml of a co-culture of P. gingivalis and S. gordonii (1010-1011 CFU/ml) in 2% carboxymethyl cellulose (CMC), twice a day for 4 weeks while the control group received 0.4 ml CMC in the same condition. The maxilla from mice were dissected and images were taken using a Faxitron UltraFocus DXA. Loss of jaw bone was analysed by measuring the distance from the cemento-enamel junction (CEJ) to the alveolar bone crest of the second molar. Aortic endothelial dysfunction was measured by multi-wire myograph system. Respiratory quotient (RQ) was measured by indirect calorimetry.

Results: 80% of the mice in the infected group showed bone loss as a result of oral inoculation of bacteria (0.7± 0.1 vs 1.2± 0.2). Infected mice showed less relaxation of aorta in response to acetylcholine. RQ was higher in the infected group indicative of greater carbohydrate oxidation. H-E staining of a segment of aorta showed some reduction in medial layer in infected mice compared to control.
Conclusion: Reduced relaxation of aorta in response to acetylcholine in periodontitis-infected mice is associated with endothelial cell impairment and endothelial dysfunction that may increase risk of plaque and foam cell formation leading to the development of atherosclerotic disease.

K02 Translating research into acute paediatric care settings: streamlining sustainable child protection practices into routine paediatric emergency care

Jennifer Fraser

Susan Wakil School of Nursing and Midwifery

Each state and territory in Australia has enacted legislation to protect children from child abuse and neglect. These mandatory reporting laws vary between jurisdictions. They vary, for example, in mandating who is required to report by law, what must be reported, who receives the report and what the penalties are for not reporting. Australian children are protected even further by a) the duty of care owed to them, and b) professional and industry policies. NSW Health employees have a very broad policy-based duty to report their knowledge and suspicion of severe abuse and neglect that goes beyond the more narrow legislative reporting duty.

Doctors and nurses working in busy clinical paediatric settings are very aware of their legal and professional duty to report child abuse and neglect. They are trained in how to recognise suspicious injury presentations, how to report to child protection authorities and they understand that the purpose of reporting is twofold. It is aimed at protecting the child from serious harm and reducing the risk of recurrence by initiating family support services.

Nevertheless, under-recognition and under-reporting of child abuse and neglect remains a problem. Personal beliefs and attitudes, lack of time

and a perception that it is 'not my responsibility' impact on recognition and response to child abuse. Despite strong evidence for sound child protection practice in acute care settings, barriers to using the evidence in practice remain. In this presentation, I will present an overview of the work that has lead up to our current research program to implement evidence into the child protection practice of Emergency Department staff in four hospitals across two Local Health Districts. The work is supported by a NSW Health Translational Research Grant to June 2019. A state-wide implementation plan will then be designed on the basis of our findings.

P04 Derivation and analysis of latent handwriting features as clinical markers of Parkinson's Disease

Simon Poon[1], Mark Latt[2], Clement Loy[3,4], Christine Poon[1], Niku Gorji[1]

[1] School of Information Technologies
[2] Royal Prince Alfred Hospital, Central Clinical School
[3] Huntington Disease Service, Westmead Hospital
[4] Sydney School of Public Health

Objectives: To derive physiologically-relevant handwriting features from a Parkinson's Disease (PD) handwriting dataset in order to determine their clinicometric significance and differential power with the aim of developing an objective decision support platform for more accurate diagnosis of PD.

Background: Impaired handwriting (dysgraphia) is well documented to be an early symptom of Parkinson's disease. Traditionally, assessment is based on both observation of the handwriting process and static result of drawing tasks. Advances in digitized pen and tablet technologies in recent years have enabled the scientific evaluation of handwriting metrics (graphonomics), including dynamic features that are increasingly shown to be clinically-relevant to the diagnostic regime for neurodegenerative disorders including PD. Graphonomics augments the depth of insight that can be gained from existing handwriting and drawing tasks that are well-established components of cognitive impairment tests such as the Mini Mental State Exam (MMSE). Several such digitized drawing and writing tasks have been investigated for assessing motor disruption caused by neurodegenerative disorders; these include: signature, pentagon copying, clock drawing, spiral drawing and cursive/circular looping. Among these, the standard spiral drawing test (SST) is commonly used for evaluating motor performance and tremor in PD. In this test, patients typically trace Archimedean spirals templated on a programmable pressure-sensitive graphics tablet with the degree of accuracy providing quantifiable assessment of tremor. A piece of paper may be overlaid to provide instant visual feedback. The dynamic spiral test (DST) is a variation of the SST proposed by Isenkul et al that involves tracing a blinking spiral template.

Methods: Sixteen latent features were derived from a raw dynamic spiral drawing dataset consisting of six base variables recorded from the drawing tasks of 25 PD patients and 15 healthy controls. Univariate analysis was first performed to rank the features then ranked according to statistical significance. A step-wise logistic regression model was then developed to evaluate the latent features on their classification accuracy.

Results: Our results showed that latent features such as variation in grip angle, handwriting speed and vertical dimensions of the drawing output have high predictive potential, with a combined classification accuracy of 85% in differentiating PD patients from healthy controls.

Conclusion: Graphonomic feature recording typically focuses on several raw base variables from which secondary features can be calculated. Feature expansion, followed by statistical ranking of the most highly correlated features allow creation of a more accurate classification model. It is critical to evaluate all potentially informative graphonomic features in order to develop an accurate diagnostic support tool for PD. We are at the early stage of developing a data capturing app on mobile tablet.

P05 The 'heart' of the matter: biomarkers of autonomic balance for predicting mental disorder and recovery following road traffic injuries

Ilaria Pozzato[1], Ashley Craig[1], Bamini Gopinath[1], Yvonne Tran[1], Michael Dinh[2], Mark Gillett[3], Ian D Cameron[1]

[1] **John Walsh Centre for Rehabilitation Research, Northern Clinical School, Kolling Institute of Medical Research**
[2] **Emergency Department, Royal Prince Alfred Hospital, Sydney**
[3] **Emergency Department, Royal North Shore Hospital, Sydney**

Background: Experiencing a road crash can be highly distressing, and psychological distress is a major risk factor for the development of serious mental health disorders and poorer recovery in the long term. By investigating sensitive biomarkers of autonomic balance, it may be possible to assess the individual's response to the crash, reducing risk of psychopathology and improving chances of quicker recovery. A measure of heart function, called heart rate variability (HRV), is a promising non-invasive biomarker of a person's capacity to cope with a stressful event.

Aim: This study is designed to (i) determine the risk of psychological distress and poor recovery 6 to 12 months after a road crash, (ii) test the ability of biomarkers of autonomic balance in the early detection of at-risk individuals, and (iii) investigate the relationship between mental and physical health outcomes.

Methods: This study is a controlled prospective cohort study, conducted with up to 120 adults who have experienced a mild-moderate traffic injury and presenting to an Emergency Department (ED) in two major hospitals in Sydney. Comparisons to a matched control group, who have not experienced a MVC or severe injury in the past 5 years, will also occur. Biomarkers of autonomic balance will be assessed within 4 weeks of the crash, as well as a combination of bio-psychosocial factors based on the WHO International Classification of Functioning. Follow-up will occur at 3, 6 and 12 months post-crash.

Conclusion: The study has received Ethical approvals by the Sydney Local Health District (HREC/15/RPAH/423) and has been prospectively registered (ACTRN 12616001445460). To date, 120 ED participants have been recruited. Findings will clarify whether autonomic biomarkers (perhaps in conjunction with psychosocial markers) can assist in early identification of people who are vulnerable to developing psychopathology, leading to improved personal recovery and compensation outcomes, decreasing medical and insurance costs, and preventing long-term chronic mental disorder.

P06 Understanding health and disease through immune monitoring

Helen McGuire[1], John Miles[2], Susan Carrick[4], Jeffery Craig[3], Richard Saffery[3], Barbara Fazekas de St Groth[1]

[1] **Discipline of Pathology, School of Medical Sciences, Sydney Medical School and the Ramaciotti Facility for Human Systems Biology**
[2] **Molecular Immunology, Australian Institute of Tropical Health and Medicine, Cairns, James Cook University**
[3] **Murdoch Children's Research Institute, Victoria**
[4] **Twin Research Node, Charles Perkins Centre**

Mass cytometry, or Cytometry by Time-Of-Flight (CyTOF), is a powerful platform for high-dimensional single-cell analysis of the immune system. It enables the simultaneous measurement of over 40 markers on individual cells through the use of monoclonal antibodies conjugated to rare-earth heavy metal isotopes. This talk will focus on the potential of mass cytometry as a novel technology can be used to unravel phenotypic and functional features of multiple immune cell populations for simultaneous assessment, tying these patters to underlying health and disease. Indeed, as our immune system becomes

'educated' there is selection and expansion of a certain repertoire of T cells, organised to recognise the overwhelming complexity of environmental exposure (pathogens etc.) that faces our adaptive immune system. Identical twins can be utilised to ask how much of this repertoire organisation and selection is individual or shared factors. This project explores the underlying heterogeneity of immune patterns, and through an exceptional Australian twins cohort and funding through the Lifespan network we are uniquely placed to examine how our 'immuno-rheostat' is tuned early in life.

K03 SetDose: development of a Smart Syringe System

Rebekah Moles

Sydney Pharmacy School

Research has evidenced that there is a 1 in 5 chance of a dose error in a paediatric hospital. Sixty percent of errors are calculation based. A study that looked at errors over a five-year period, uncovered that 8% of the dose errors were 10 fold. Dose errors that are 10 or more fold are very often fatal. Our multidiscipline research team after receiving seed funds from Lifespan Network have embarked on developing a smart syringe system called SetDose. SetDose aims to prevent liquid dose errors. SetDose is a smart syringe system that eliminates errors in calculation, dispensing and administration of liquid medication dosing (both injectable and oral). It is a three part device incorporating SetDose software, individualised encoded key cards, and a device that attaches to standardised syringes, therefore these elements of the SetDose system are used in various stages of the medication management cycle to prevent error. The team have developed two early prototypes of the device that attaches to standardised syringes and is refining these prototypes to perform accuracy testing.

P07 Policy solutions for improving marginalised young people's health literacy and health system navigation

Fiona Robards[1], Melissa Kang[1,2], Lena Sanci[3], Catherine Hawke[4], Stephen Jan[5], Marlene Kong[6], Kate Steinbeck[7], Tim Usherwood[1,5]

[1] Department of General Practice, Westmead Clinical School
[2] Public Health, Faculty of Health, University of Technology Sydney
[3] Department of General Practice, University of Melbourne
[4] School of Rural Health
[5] The George Institute for Global Health
[6] The Kirby Institute, University of New South Wales
[7] Discipline of Paediatrics and Adolescent Health, Children's Hospital Westmead Clinical School

Background: The healthcare system is complex, particularly for marginalised young people who have limited health literacy. To date, prevention efforts have focused on providing information on health issues rather than health system navigation.

Aim: Funded by NSW Health to inform policy, the Access 3 is a multi-methods project which has explored health system navigation for marginalised young people with the aim of developing policy solutions. The project focused on young people aged 12-24 in NSW who belong to one or more of the following groups: Indigenous, living in rural and remote areas; homeless; refugee; and/or, gender and/or sexuality diverse.

Method: The Access 3 project included four studies:
1. Cross-sectional survey (online and paper) with targeted recruitment of marginalised young people (n=1,416).
2. Qualitative longitudinal study involving 3-4 interviews over 12 months with marginalised young people (n=41).
3. Qualitative interviews with health professionals (n=22).
4. Policy translation forum to make policy recommendations (n=64).

Results: The NSW Youth Health Survey sucessfully oversampled marginalised groups with 63.3% belonging to one or more of the predefined target groups. The longitudinal study achieved a retention rate of over 85%.

Marginalised young people struggle with health system complexity and fragmentation. Six themes realting to health literacy were identified:

1. Increasing self-reliance, confidence and empowerment
2. Attitudes towards help-seeking
3. Deciding to seek healthcare
4. Ability to find information - skills in information seeking and service promotion
5. Availability of service information - engaging, relevant, current, trustworthy and understandable
6. Learning about the health system and its navigation

Summary/conclusion: Health literacy embraces our connected, digitally-disrupted world. Using technology is an innovative way to engage marginalised young people to improve health literacy. Marginalised young people advocate for health services to provide better health and service information and for schools to include health system navigation in the curriculum.

P08 Development of N-acyl amino acids that selectively inhibit the glycine transporter, GlyT2, for the treatment of chronic neuropathic pain

Shannon N Mostyn[1], Susan Shimmon[2], Sarasa Mohammadi[1], Alexandra Schumann-Gillett[3], Zachary J Frangos[1], Megan O'Mara[3], Macdonald J Christie[1], Renae M Ryan[1], Tristan Rawling[2], Robert J Vandenberg[1]

[1] Discipline of Pharmacology, School of Medical Sciences
[2] School of Mathematical and Physical Sciences, The University of Technology Sydney
[3] Research School of Chemistry, Australian National University

Rationale: Chronic pain affects 1 in 5 Australians, and 1 in 3 Australians over the age of 65, with these numbers expected to rise as the population ages. Many sufferers do not receive adequate pain management from conventional analgesics and there is a great need to develop new therapeutics and to explore new targets to replace or assist current therapies. There is evidence that abnormal inhibitory neurotransmission in the spinal cord dorsal horn can contribute to the pathology of neuropathic pain, thus targeting the inhibitory glycine transporter, GlyT2, may restore normal inhibitory control of pain signalling and be an effective strategy to treat pain.

Methods & Results: 58 novel N-acyl amino acid analogues with varying head and tail groups were synthesised and tested for inhibitory activity at GlyT2 and the closely related GlyT1 transporter using two-electrode voltage clamp electrophysiology. Majority of analogues were found to be selective GlyT2 inhibitors with varying maximal levels of inhibition and rates of reversibility. 13 compounds inhibited GlyT2 < 100 nM, and one of these inhibitors, oleoyl D-Lys, is metabolically stable, able to cross the blood brain barrier, and has been tested in a nerve ligation rat model of neuropathic pain. Using mutagenesis and molecular modelling, we have also located the binding site of these inhibitors which will help to progress the development of next generation compounds for selective, potent inhibition of GlyT2.

Conclusions: We have greatly expanded the pool of GlyT2 inhibitors and identified new compounds with improved potency, as well as compounds which are partial and reversible; characteristics that are proposed to provide ideal in vivo activity and circumvent toxicity. The structure-activity data, in addition to modelling of the targets binding site, will greatly help to further the development of GlyT2 inhibitors as clinically relevant therapeutics for the treatment of chronic neuropathic pain.

P09 Effect of long-term polypharmacy and the Drug Burden Index (DBI) on cardiovascular function and cardiac fibrosis in aged mice

Trang Tran[1,3], John Mach[1,2,3], Gizem Gemikonakli[1,2,3], Lydia Conti[1,3], Alexander Widiapradja[1,3], Scott P Levick[1,3], David G Le Couteur[4], Sarah N Hilmer[1,2,3]

[1] Kolling Institute of Medical Research
[2] Department of Aged Care and Clinical Pharmacology, Royal North Shore Hospital
[3] Northern Clinical School
[4] Department of Geriatric Medicine, Concord Clinical School and ANZAC Research Institute

Introduction: Polypharmacy (use of ≥ 5 medications) and increasing Drug Burden Index (DBI: cumulative exposure to anticholinergic and sedative drugs) impair functions in older adults. Preclinical studies can provide a mechanistic understanding. We aim to evaluate the effect of chronic polypharmacy, medications with increasing DBI and deprescribing (cessation of medications) on cardiovascular function and histology in aged mice.

Methods: Twelve-month-old male C57BL/6 mice (n = 25-40/group) received control chow or feeds/water containing therapeutic doses of drugs in polypharmacy regimens of Zero DBI (simvastatin, metoprolol, omeprazole, paracetamol and irbesartan), Low DBI (simvastatin, metoprolol, omeprazole, paracetamol and citalopram), High DBI (simvastatin, metoprolol, oxybutynin, oxycodone and citalopram) or monotherapy with each of the five drugs from the High DBI regimen. At the age of 21 months, animals were re-randomised to continue treatment or be deprescribed (n = 20-25/group). Blood pressure (BP) and rotarod performance (endurance) were assessed every three months. Hearts were collected at 26 months of age and stained with picrosirius red for collagen.

Results: At 21 months, compared to control, we observed a decrease in systolic and diastolic BP in Zero DBI, Low DBI, metoprolol, and simvastatin treated mice ($p<0.05$) but not in High DBI (regimen includes metoprolol and simvastatin) group ($p>0.05$). Compared to control, rotarod latency-to-fall declined in mice administered citalopram at all time points ($p<0.05$), with a non-significant improvement after deprescribing. Preliminary staining with picrosirius red (n=5) indicates that compared to control (0.38±0.07%), High DBI treatment increased myocardial collagen in mice (0.68±0.09%, $p=0.039$) while Zero DBI, Low DBI, metoprolol and simvastatin did not show any significant difference ($p>0.05$).

Conclusions: Chronic High DBI diet may impair therapeutic effects of cardiac drugs on BP and increase myocardial collagen. Citalopram reduces endurance. Future studies will continue to explore morphological changes of the heart including cardiac thickness, collagen content and cardiomyocyte damage.

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