2017 Hunter Cancer Research Symposium

24th November 2017
Hunter Medical Research Institute, Kookaburra Circuit,
New Lambton Heights, NSW, Australia
www.hcra.com.au
A message from the organizing committee

Welcome to the 2017 Hunter Cancer Research Symposium.

The Hunter Cancer Research Alliance (HCRA) has over 350 members, ranging from PhD students to clinicians, research fellows and eminent research leaders. This Symposium aims to foster collaborations among cancer researchers, clinicians and health professionals operating across basic science, clinical research, clinical practice, health services research and implementation science.

The overarching theme of this Symposium is “Translating research for impact” and will cover the full spectrum of the translational research-to-practice continuum from basic science to clinical research and implementation research. We believe bringing together expertise from diverse research and clinical areas will ensure an invaluable forum for all participants.

We wish to thank our invited speakers, Professor Barry Bultz and Professor Susan Clark for accepting our invitation to share their wealth of expertise with our local community. Their keynote addresses on future approaches to precision supportive oncology care and the cancer genome and epigenome in 3D will contribute to our aim of promoting and encouraging high-quality translational research having positive impacts on the community.

Our local researchers have contributed oral and poster presentations that will provide engaging and informative sessions highlighting the high-quality research being carried out in the Hunter New England Region. We are very pleased to provide students with opportunities to disseminate their research via a number of presentations by local PhD students. For our 2017 Symposium, we are facilitating Symposium participation by community members and representatives from the HCRA Consumer Advisory Panel via our research breakfast session and panel discussion. Finally, a warm welcome to all our delegates, thank you for your participation in what promises to be an excellent forum to share knowledge, network and expand collaborations.

Warm Regards

HCRA Symposium Organizing Committee
## Session 1: Cancer Biology

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<tr>
<td>8:45–9:00</td>
<td>OR 1</td>
<td>Nucleotide excision repair proteins ERCC1 and XPC, and tumor-infiltrating lymphocytes are biomarkers of neoadjuvant platinum resistance in high grade serous ovarian cancer.</td>
<td>Nikola Bowden</td>
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<tr>
<td>9:00–9:15</td>
<td>OR 2</td>
<td>Novel PP2A inhibitory protein in c-KIT mutant myeloid progenitor cells</td>
<td>Callum Rigby</td>
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<td>9:15–9:30</td>
<td>OR 3</td>
<td>Sympathetic and sensory nerve infiltration in breast cancer</td>
<td>Nathan Griffin</td>
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<td>9:30–9:45</td>
<td>OR 4</td>
<td>Extracellular vesicles from tetraspanin-modified prostate cell lines display protease activity</td>
<td>Joshua Brzozowski</td>
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## Session 2: Keynote Presentation

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<tr>
<td>9:45–10:30</td>
<td>KN1</td>
<td>The Cancer Genome and Epigenome in 3D</td>
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<td>11:00–11:15</td>
<td>OR 5</td>
<td>Early phase II study of Azacitidine and Carboplatin priming for Avelumab in patients with advanced melanoma who are resistant to immunotherapy</td>
<td>Andre van der Westhuizen</td>
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<td>11:15–11:30</td>
<td>OR 6</td>
<td>Testing the effectiveness of a general practice intervention to improve uptake of colorectal cancer screening: A randomised controlled trial</td>
<td>Natalie Dodd</td>
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<td>11:30–11:45</td>
<td>OR 7</td>
<td>An intervention to improve nutrition guideline compliance in childcare services</td>
<td>Kirsty Seward</td>
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<td>11:45–12:00</td>
<td>OR 8</td>
<td>Eating As Treatment (EAT): Improving treatment outcomes for head and neck cancer patients undergoing radiotherapy with a Health Behaviour Intervention</td>
<td>Ben Britton</td>
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<td>12:00–12:15</td>
<td>OR 9</td>
<td>Cross sectional survey to inform the development of a telehealth support model for women undergoing breast cancer surgery</td>
<td>Natasha Noble</td>
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## Session 4: Keynote Presentation

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<tr>
<td>12:15–1:00</td>
<td>KN2</td>
<td>Precision Supportive Care: Future Directions</td>
<td>Barry Bultz</td>
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## Session 5: Rapid Research Reflections

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<td>2:30–2:35</td>
<td>OR 10</td>
<td>Reduced expression of the protein phosphatase 2A regulatory subunit B55α in luminal breast cancer: Effect on tumour progression and anti-hormonal therapy</td>
<td>Abdul Mannan</td>
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<td>2:35–2:40</td>
<td>OR 11</td>
<td>The encompassing role of tumor suppressive phosphatase in mammalian development and cancer</td>
<td>Nikita Panicker</td>
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### Session 5: Rapid Research Reflections

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<tr>
<td>2:40–2:45</td>
<td>12</td>
<td>Yanfang Chen</td>
<td>To quantitate DNA Damage Repair Pathways in human cancers via establishment of a sensitive and quantitative mass spectrometry based assay</td>
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<td>2:45–2:50</td>
<td>13</td>
<td>Hamed Yari</td>
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<td>Mary-Claire Hanlon</td>
<td>Nurturing a research culture within a clinical radiation oncology department</td>
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<td>2:55–3:00</td>
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<td>Sandeep Gupta</td>
<td>PSMA PET-CT for prostate cancer: Distribution of disease and implications for radiotherapy planning</td>
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<td>3:00–3:05</td>
<td>16</td>
<td>Alexandre Xavier</td>
<td>A new landscape of mutation for Hereditary Non-Polyposis Colorectal Cancer</td>
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<td>3:05–3:10</td>
<td>17</td>
<td>Haylea Richardson</td>
<td>Assessing the impact of magnetic resonance treatment simulation (MRSIM) on target volume delineation and resultant dose to organs at risk for oropharyngeal radiotherapy</td>
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3:10–4:00 Afternoon Tea and Poster Parade

### Session 6: Rapid Research Reflections

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<tr>
<td>4:00–4:05</td>
<td>18</td>
<td>Nadine Berry</td>
<td>HD-SNP Microarray analysis of the Study 9 high risk ALL patients – Increased yield of important prognostic information</td>
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<td>4:05–4:10</td>
<td>19</td>
<td>Heather Murray</td>
<td>Targeting Error-Prone DNA Double-Strand Break Repair in Acute Myeloid Leukaemia (AML)</td>
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<td>4:10–4:15</td>
<td>20</td>
<td>Mamta Pariyar</td>
<td>Validation of four triple negative breast cancer specific genes and their association with prognosis</td>
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<td>4:15–4:20</td>
<td>21</td>
<td>Gillian Gould</td>
<td>Health professionals performing the “5As” for smoking cessation and prescribing nicotine replacement therapy during pregnancy: meta-analysis of a systematic review</td>
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<td>4:20–4:25</td>
<td>22</td>
<td>Emma Byrnes</td>
<td>Distress screening and management for Australian cancer patients: The evidence practice gap and potential bridges</td>
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<td>4:25–4:30</td>
<td>23</td>
<td>Nicholas Zdenkowski</td>
<td>Results of a survey investigating cancer patients' willingness to travel to participate in a clinical trial</td>
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<td>4:30–4:35</td>
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<td>Kathryn Reilly</td>
<td>Scale up of a multistrategic intervention to increase implementation of a mandatory state-based healthy canteen policy</td>
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<td>4:35–4:40</td>
<td>25</td>
<td>Andrea Mathe</td>
<td>Can hormonal changes influence DNA integrity to protect us from colorectal cancer?</td>
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4:40–5:15 Nibble Break
5:15–5:30 Award Ceremony
5:30 Symposium Concludes
Keynote speakers

Professor Susan Clark, FAA
NHMRC Senior Principal Research Fellow, Head of Division of Genomics and Epigenetics, Head of Epigenetics Research Laboratory, Garvan Institute of Medical Research

Biography
Professor Susan Clark has a highly acclaimed international reputation for her work in cancer epigenetics. Susan is a NHMRC Senior Principal Research Fellow and Head of the Genome and Epigenetics Division at the Garvan Institute of Medical Research in Sydney, Australia. She graduated in 1982 with a PhD in Biochemistry at the University of Adelaide. Her molecular studies over her career have addressed profound questions about the importance of epigenetics in early development and in disease, especially in cancer. The techniques she pioneered in the early 1990s, including bisulphite methylation sequencing, helped to revolutionize epigenomic research. Susan was a founding member of IHEC (International Human Epigenome Consortium) and led the formation of the AEpiA (Australian Epigenetics Alliance). She has a number of awards including the RPAH Research Medal (2002), Julian Wells Medal (2003); “Biochemisch Analytik Preis” for outstanding contribution for Methylation analysis in 2004. In 2006, she was elected a Fellow of the World Technology Network for Biotechnology; in 2012, she was awarded the National Rotary Vocational Award; and in 2015, she was elected a Fellow of the Australian Academy of Science and received the NSW Cancer Institute “Make a Difference” Award and the Nadine Watson Annual Lecture Award.

Title of Presentation: “The Cancer Genome and Epigenome in 3D”

Barry D. Bultz, AOE, PHD
Director, Department of Psychosocial and Rehabilitation Oncology, Tom Baker Cancer Centre, and Professor and Head, Division of Psychosocial Oncology, Cumming School of Medicine, University of Calgary

Biography
Barry D. Bultz, PhD, holds the Daniel Family Leadership Chair in Psychosocial Oncology and is Professor and Head in the Division of Psychosocial Oncology, Cumming School of Medicine at the University of Calgary. He is the Director in the Department of Psychosocial and Rehabilitation Oncology, Tom Baker Cancer Centre in Calgary. Dr. Bultz is a cofounder and Past President of the Canadian Association of Psychosocial Oncology (CAPO). He served as an Invited Director of the Board of the American Psychosocial Oncology Society. From 2012 to 2014, Dr. Bultz served as the President of the International Psycho-Oncology Society.

He advocates for the recognition of the impact of cancer-related distress (6th Vital Sign) on patient experience and has published and presents frequently on the importance of screening and management of distress. His work with cancer patients has seen him receive many awards, including the Queen’s Diamond Jubilee Award, the Alberta Order of Excellence in 2016 and the Arthur Sutherland Award from the International Psycho-Oncology Society in 2016. In February 2017, he was elected a Fellow of the American Psychosocial Oncology Society – the first for a non-American.

Title of Presentation: “Precision Supportive Care: Future Directions”
ORAL ABSTRACTS

OR1  |  Nucleotide Excision Repair Proteins ERCC1 and XPC, and Tumor-Infiltrating Lymphocytes are Biomarkers of Neoadjuvant Platinum Resistance in High-Grade Serous Ovarian Cancer

J Scorry1, B van Zyl2,3, G Damien2,3, K Jaaback4, G Otton4, N Bowden2,3
1 Pathology NORTH, John Hunter Hospital, New Lambton Heights, NSW, Australia
2 Priority Research Centre for Cancer Research, Innovation and Translation, Faculty of Health & Medicine, University of Newcastle, Callaghan, NSW, Australia
3 Hunter Medical Research Institute Cancer Research Program, New Lambton, Newcastle, NSW, Australia
4 Surgical Oncology, Calvary Mater Hospital, Waratah, NSW, Australia

Background: Platinum-based chemotherapies such as cisplatin and carboplatin alone or in combination with other agents are the most effective pharmacological treatment for high-grade serous ovarian cancer. Nucleotide excision repair (NER) is the biological process that recognizes DNA that has been damaged by platinum therapies and triggers apoptosis via XPC and downstream ERCC1. The presence of tumor-infiltrating lymphocytes (TILs) have been associated with longer survival and high genomewide mutation load in other cancer types.

Aims: To determine if a combination of ERCC1, XPC and TILs would be strong biomarkers of platinum response in HGSOC tissue collected after neoadjuvant platinum chemotherapy.

Methods: A total of 115 high-grade serous ovarian cancer Formalin Fixed Paraffin Embedded (FFPE) tissue samples were sequentially collected from 2000 to 2015 from Pathology NORTH, NSW Australia. Twenty-three received neoadjuvant chemotherapy and the remaining 92 received adjuvant chemotherapy. Full face sections of FFPE tissue blocks were used for immunohistochemistry analysis of ERCC1 and XPC. Staining intensity from 0 to 3, percentage of cells stained and localization of staining was assessed by an independent pathologist or researcher for ERCC1 and XPC. TILs were scored from 0 to 3 ranging from absent to marked and diffuse. Kaplan–Meier survival curves were produced and stratified by primary treatment (chemotherapy/surgery) with pointwise 95% confidence intervals. P-values from the log-rank and Wilcoxon tests were calculated along with number of subjects at risk.

Results: The effect on overall survival observed for ERCC1 staining score in the neoadjuvant chemotherapy group was significant: Analysis of XPC staining score found no significant difference in chemotherapy versus surgery as primary treatment groups. There was a trend toward cytoplasmic localization of XPC in HGSOC with absent or low ERCC1, indicating that incorrect localization of XPC may contribute to low ERCC1. TILs scores alone were not predictive of overall survival; however, the association of TILs and ERCC1 expression was not able to be determined.

Conclusions: ERCC1 was identified as a biomarker of platinum response in neoadjuvant HGSOC. There is potential that localization of XPC and presence of TILs will further add accuracy to assess this biomarker combination in future studies.

Translational Aspect: This is a T1 study that will translate straight into T2 with the completion of a larger cohort.

OR2  |  Novel PP2A Inhibitory Protein in C-KIT Mutant Myeloid Progenitor Cells

C Rigby1,2, H Toop3, J Al Mazi1,2, J Morris3, A Enjeti1,2,4, N Verrills1,2, M Dun1,2
1 Hunter Medical Research Institute, Cancer Research Program, New Lambton, Newcastle, NSW, Australia
2 School of Biomedical Sciences and Pharmacy, Faculty of Health and Medicine, University of Newcastle, Callaghan, NSW, Australia
3 School of Chemistry, University of New South Wales, Sydney, NSW, Australia
4 Calvary Mater Hospital, Newcastle, NSW, Australia

Background: Acute myeloid leukaemia (AML) has a poor prognosis, with a 5-year survival 23.6%. Current therapies are effective at inducing remission; however, two-thirds of patients relapse, highlighting the need to improve treatment. Activity of the protein phosphatase tumor-suppressor, PP2A, is reduced in 78% of AMLs leading to unregulated growth and survival. PP2A reactivating drugs have been developed (FTY720 and AAL(S)); however, their mechanisms of action remain poorly understood. We have identified a novel protein target of these drugs, the Shwachman–Bodian—Diamond syndrome protein (SBDS) in AML cells.

Aims: The aim of our investigation was to delineate the role SBDS plays in the PP2A inhibition of AML and to characterize SBDS’s role in oncogenic signaling, to determine whether SBDS is a novel drug target.

Methods: We undertook molecular inhibition of SBDS (shRNA-mediated knockdown) in growth factor dependant and c-KIT/D816V mutant mammalian myeloid progenitor cells. Co-immunoprecipitation, colocalization and in-silico modeling were used to assay SBDS-PP2A...
Sympathetic and Sensory Nerve Extracellular Vesicles from

**ORAL ABSTRACTS**

Griffin1, FG a o1, S Faulkner1, M Walker2,3, P Jobling1, Brzozowski1,2,3, H Jankowski1,2,3, B Munro2,3,4, D Bond1,2,3, H Hondermarck1

The neurotransmitter receptors beta 3 adrenergic receptor, muscarinic receptor M3 and NK-1 substance P receptor were overexpressed in breast tumors. All three receptors were associated with breast tumor progression (grade).

**Conclusions:** The results described herein, present a novel PP2A inhibitory protein that may be a potential new drug target for the improved treatment of mutant c-KIT AML.

**Translational Aspect:** Investigation into the molecular mechanisms involved in the cross talk between nerves and cancer cells has the potential to open up new antineurogenic treatment strategies.

**OR4 | Extracellular Vesicles from Tetraspanin-Modified Prostate Cell Lines Display Protease Activity**

J Brzozowski1,2,3, H Jankowski1,2,3, B Munro2,3,4, D Bond1,2,3, C Scarlett1,2,3, K Skelding1,2,3, J Weidenhofer1,2,3

**Background:** The tetraspanins CD9 and CD151 become altered in expression as prostate cancer progresses toward metastasis. These tetraspanins are abundantly found on the surface of extracellular vesicles (EVs), secreted from all cells of the body. An important step in the metastatic cascade is the degradation of the extracellular matrix (ECM), to allow for the migration of a metastatic tumor cell, a step in which EVs are thought to play a role.

**Aims:** We aimed to determine whether EVs, isolated from prostate cell lines with altered tetraspanin expression profiles, have any functional protease activity associated with them.

**Methods:** RWPE1 cells were transfected to either display low CD9, or high CD151 expression, as is seen in advanced prostate cancer. EVs were isolated from the cell culture media of these cell lines, including their vector control cell lines, using a centrifugal ultrafiltration protocol. Western blot was used to assess tetraspanin expression in cell and EV samples. Zymography was used to determine whether the EVs had any functional protease activity.

**Results:** The CD9 and CD151 expression of cells correlated with the expression observed on the EVs they secrete. Zymography showed that altering the tetraspanin expression in cells altered the activity of the matrix metalloproteinase (MMP) activity in the EVs they secreted.

**Conclusions:** This data suggest that CD151 and CD9 expression on cells may play an important role in the incorporation of active proteases into the resultant EVs. Further, these EVs may have implications in the degradation of the ECM and formation of a premetastatic niche.

**Translational Aspect:** This research is currently at the T1 stage, with the potential to move toward clinical outcomes in the future.

**OR3 | Sympathetic and Sensory Nerve Infiltration in Breast Cancer**

N Griffin1, F Gao1, S Faulkner1, M Walker2,3, P Jobling1, H Hondermarck1

1 School of Biomedical Sciences and Pharmacy, Faculty of Health and Medicine, University of Newcastle, Callaghan, NSW, Australia
2 School of Public Health and Medicine, Faculty of Health and Medicine, University of Newcastle, Callaghan, NSW, Australia
3 Hunter Medical Research Institute, New Lambton Heights, NSW, Australia

**Background:** In recent years, evidence has revealed the essential role of nerves in the development and progression of cancer. Derivation of primary tumors in several cancers suppresses cancer growth and metastasis. Conversely, tumors stimulate nerve infiltration through secretion of neurotrophic growth factors. In breast cancer, nerves are present in the tumor microenvironment and associated with worse clinicopathological outcomes; however, the molecular pathways involved in this reciprocal interaction warrant further clarification.

**Aims:** In the present study, we aimed to clarify the specific subtype of nerve fibres present in the breast tumor microenvironment. Additionally, we aimed to demonstrate the ability of breast cancer cells to induce neuronal growth and to explore the relationship

**Methods:** Specific nerve subtypes and neurotransmitter expression were investigated by immunohistochemistry on invasive breast tumor microarrays. Quantification was performed using the HALO image analysis platform. To investigate the ability of breast cancer cells to induce neuronal growth, we used cocultures with primary neuronal cells harvested from chick embryos.

**Results**

1. Sympathetic and occasionally sensory nerves, but no parasympathetic nerves, were detected in the breast tumor microenvironment.
2. The presence of directional neuronal growth was observed in coculture studies, with neurites extending toward breast cancer cells.
3. The neurotransmitter receptors beta 3 adrenergic receptor, muscarinic receptor M3 and NK-1 substance P receptor were
OR5  |  Early Phase II Study of Azacitidine and Carboplatin Priming for Avelumab in Patients with Advanced Melanoma Who are Resistant to Immunotherapy

A van der Westhuizen1,2,3, M Graves2,3, R Levi4, R Vilain2,3,5, N Bowden2,3
1 Medical Oncology, Calvary Mater Hospital, Waratah, NSW, Australia
2 Priority Research Centre for Cancer Research, Innovation and Translation, Faculty of Health & Medicine, University of Newcastle, Callaghan, NSW, Australia
3 Hunter Medical Research Institute, Cancer Research Program, New Lambton, Newcastle, NSW, Australia
4 Surgical Oncology, Calvary Mater Hospital, Waratah, NSW, Australia
5 Pathology NORTH, John Hunter Hospital, New Lambton Heights, NSW, Australia

Background: The mechanism of action for carboplatin is insertion of platinum into DNA to form cross-links that are recognized by the global genome repair proteins XPC, DDB1 and DDB2. Reduced levels of global genome repair result in a lack of apoptosis, limited or no response to platinum treatment and an increase in mutation load across the platinum-treated genome.

5-Aza-2′-deoxycytidine (decitabine) and 5-azacytidine (azacitidine) reactivate the expression of genes silenced by hypermethylation. Previous studies have shown that decitabine and azacitidine enhance the antitumor immune response and can increase PDL-1 expression, increasing sensitivity to the anti-PDL1 antibody class of agents. This leads to epigenetic “priming” of the microenvironment prior to immunotherapy.

Aims: To assess if sequential treatment with azacitidine and carboplatin will result in: (i) decrease in methylation and increase in gene expression, (ii) increase in immune response markers in tumor and blood and (iii) reactivation of immune sensitivity, resulting in “priming” for immunotherapy.

Methods: Ten patients will receive two cycles of Azacitidine or decitabine for 5 days followed by Carboplatin on day 8; followed by Avelumab every 2 weeks until disease progression according to immune response criteria. Blood and tumor biopsies will be assessed for altered immune cell subsets.

Results: One patient with metastatic melanoma has completed two cycles of decitabine and carboplatin. At the completion of the “priming cycles,” there were no grade 3 or 4 adverse events recorded and the patient had stable disease (SD) as determined by RECIST 1.1. The immune activation profile from peripheral blood collected before, during and after the two decitabine/carboplatin cycles indicated changes in the activation and exhaustion markers on CD4 cells, possibly due to priming protocol.

Conclusions: The sequential combination of decitabine and carboplatin was safe and efficacious for the first patient recruited to the trial.

Translational Aspect: This is a T2 project that is a follow-on from a T1 discovery project. The outcomes of this trial will be a new, low-cost and effective treatment for resistant metastatic melanoma.

OR6  |  Testing the Effectiveness of a General Practice Intervention to Improve Uptake of Colorectal Cancer Screening: A Randomized Controlled Trial

N Dodd1,2,3, M Carey1,2,3, E Mansfield1,2,3, C Oldmeadow4
1 Health Behaviour Research Collaborative, School of Medicine and Public Health, Faculty of Health and Medicine, University of Newcastle, Callaghan, NSW, Australia
2 Priority Research Centre for Health Behaviour, University of Newcastle, Callaghan, NSW, Australia
3 Hunter Medical Research Institute, New Lambton Heights, NSW, Australia
4 Clinical Research Design, IT and Statistical Support (CrEDITSS), Hunter Medical Research Institute, New Lambton Heights, NSW, Australia

Background: Colorectal cancer (CRC) is a leading cause of cancer morbidity and mortality in Australia. CRC is amenable to screening as it develops slowly and can be detected before symptoms are noticed. Current data suggest that two-thirds of those eligible for CRC screening are not up-to-date with CRC screening recommendations. General practitioners have an important role in promoting preventive health activities, including CRC screening. General practitioner endorsement is associated with positive screening behaviors.

Aims: To examine the effectiveness that an intervention consisting of provision of point-of-care fecal occult blood test (FOBT), printed screening advice and general practitioner endorsement has on CRC screening uptake when compared to usual care.

Methods: Randomized controlled trial conducted in four general practices in the Hunter region of NSW. Patients aged 50–74 presenting for an appointment with their general practitioner completed a touch-screen survey. Those at average risk of CRC that had not completed a FOBT in the past 2 years nor colonoscopy in the past 5 years were eligible for the study. Randomization was by day of attendance at the practice. The primary aim was analyzed using a logistic regression model.

Results: One hundred and nineteen patients were recruited in the trial, 67 (56%) received usual care and 52 (44%) received the intervention. Preliminary analyses indicate that screening uptake was higher among those that received the intervention (38%) when compared to usual care (7%).

Conclusions: Our results indicate that point-of-care FOBT, printed screening advice and physician endorsement of CRC screening increased screening uptake. General practice interventions should be considered as an important adjunct to existing population-based screening strategies.

Translational Aspect: Despite general practice guidelines recommending regular FOBT, there remains an evidence-practice gap with colorectal cancer screening rates lower than desirable levels. This T3 research tests an intervention to close the “evidence-practice” gap in CRC screening.
An Intervention to Improve Nutrition Guideline Compliance in Childcare Services

K Seward1,2,3, L Wolfenden1,4,5, M Finch1,4,5, J Wiggers1,4,5, R Wyse6,7, J Jones1,4, S Yoong1,4,5
1 Hunter New England Population Health, WallSEND, NSW, Australia
2 School of Medicine and Public Health, University of Newcastle, Callaghan, NSW, Australia
3 Hunter Cancer Research Alliance, Newcastle, NSW, Australia
4 Priority Research Centre for Cancer Research, Innovation and Translation, Faculty of Health & Medicine, University of Newcastle, Callaghan, NSW, Australia
5 Hunter Medical Research Institute, New Lambton Heights, NSW, Australia

Background: In 2012, only 3% of Australian preschool aged children met daily recommendations for vegetable intake and 22% for daily fruit intake. Dietary habits developed in childhood are known to track into adulthood and influence the risk of chronic disease including cancer. Implementing dietary guidelines in the childcare setting can have positive public health outcomes and is recommended by the World Health Organization. Despite this, research shows that dietary guidelines are poorly implemented by childcare services.

Aims: To assess the effectiveness of a theory informed multistrategy intervention on improving compliance with nutrition guidelines in childcare services; and the impact of improved nutrition guideline compliance on child dietary intake while in care.

Methods: A random sample of 52 childcare services were randomly allocated to a 6-month implementation intervention. The intervention was designed utilizing the theoretical domains framework. Intervention strategies included: securing executive support, provision of education and training, and the rigorous assessment of primary and secondary outcome measures. To assess the effectiveness, comprehensive menu reviews were completed by a dietitian, blinded to group allocation. Child dietary intake was assessed via aggregate plate waste measures and educator compliance was designed utilizing the theoretical domains framework. Intervention strategies included: securing executive support, provision of education and training, and the rigorous assessment of primary and secondary outcome measures.

Results: The trial had a significant increase in childcare service menu compliance with three of the five Australian Guide to Healthy Eating food groups (fruit [P < 0.05], meat and alternatives [P < 0.05] and dairy [P < 0.05]) and discretionary foods (P < 0.05). The trial also resulted in a significant increase in service-level child fruit and vegetable food group serve consumption and individual child usual food group consumption of vegetables; fruit; breads and cereals; and meat and alternatives.

Conclusions: The findings indicate that service level changes to menus in line with dietary guidelines can result in improvements to children’s dietary intake. The strengths of this trial include its randomized design, the use of the theoretical domains framework to guide intervention strategy selection and the rigorous assessment of primary and secondary outcome measures.

Translational Aspect: T3 - Translation to Practice

The research trial focuses on improving the implementation of evidence-based sector nutrition guidelines in center-based childcare services.

Eating as Treatment (EAT): Improving Treatment Outcomes for Head and Neck Cancer Patients Undergoing Radiotherapy with a Health Behavior Intervention

B Britton1, A Baker1, A Beck1, K McCarter1, L Wolfenden2, C Wratten1, J Bauer3
1 School of Medicine & Public Health, Faculty of Health & Medicine, University of Newcastle, Callaghan, NSW, Australia
2 Department of Radiation Oncology, Calvary Mater Newcastle Hospital, Waratah, NSW, Australia
3 Centre for Dietetics Research, The University of Queensland, St Lucia, QLD, Australia

Background: Malnutrition is a significant problem in the head and neck cancer (HNC) population and is associated with an increase in complications due to side effects of treatment and morbidity.

Aims: A dietitian delivered health behavior change intervention was implemented to reduce malnutrition in HNC patients undergoing radiotherapy: eating as treatment (EAT).

Methods: A stepped wedge cluster randomized design was used. Dietitians were trained in the EAT intervention, including both intervention-specific skills and behavior change counselling (BCC) skills. Practice change strategies were also implemented to improve intervention adherence and care according to evidence-based dietetic guidelines.

HNC patients were recruited from four Australian radiotherapy departments. The primary outcome of nutritional status (Patient Generated Subjective Global Assessment; PG-SGA) was analyzed using generalized linear mixed models. Dietitian adherence to BCC and study-specific skills were assessed using a 20% random sample of audio recorded and coded dietetic sessions. Frequencies of patients of whom dietetic clinical guidelines were implemented were assessed via medical record audits. The change in the odds of implementation was assessed via logistic regression.

Results: The intervention was effective in significantly reducing malnutrition P = 0.025. Relative to pretraining, application of both study-specific skills and BCC was significantly greater. For four of the evidence-based guidelines, the estimated odds ratio was significantly different to 1.

Conclusions: EAT is a potentially cost-effective intervention for changing the behavior of dietitians, promoting improved compliance with guidelines and improving cancer patient outcomes.

Translational Aspect: This trial is the first and largest multicenter trial of psychological strategies to attempt to prevent malnutrition in HNC patients (T2). The trial resulted in system wide change (T3). It has the potential to be inexpensively integrated into all cancers.

Cross-Sectional Survey to Inform the Development of a Telehealth Support Model for Women Undergoing Breast Cancer Surgery

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The research trial focuses on improving the implementation of evidence-based sector nutrition guidelines in center-based childcare services.
Background: For patients undergoing breast cancer surgery, the pre- and postoperative periods can be characterized by feelings of fear, anxiety, isolation and uncertainty. Provision of educational, cognitive and emotive information prior to surgery has shown effectiveness for reducing postoperative anxiety, length of hospital stay and postoperative complications. There is a need to assess whether patients undergoing breast cancer surgery experience gaps in preparatory information provision, and correlates with postoperative outcomes.

Aims: To explore which aspects of surgery women would have liked more information about prior to having surgery, and any relationship between perceived preparedness for surgery and postoperative levels of anxiety and pain.

Methods: Women aged 18–85 years attending for a follow-up appointment within 2 months of undergoing surgery for breast cancer were asked to complete a baseline (T1) and 1-month follow-up (T2) survey. Surveys assessed anxiety (STAI; T1, T2), pain (VAS; T1), quality of life (FACT-B; T2), preparedness for surgery (40-item tool developed by the research group; T1) and health care utilization after surgery (T2).

Results: To date, 45 surveys T1 (50% consent rate) and 41 T2 surveys have been returned (91% response rate). The majority of the sample were aged 60+ years and had undergone a lumpectomy (67%). Over 10% of the sample would have liked more information prior to surgery including strategies to manage anxiety and how other patients had experienced similar surgery. Informational need correlates of postoperative levels of anxiety and pain will be presented.

Conclusions: The specific aspects of preparing for and undergoing surgery where women wanted more information and that were associated with postoperative levels of pain and anxiety will be used to inform the development and testing of a telehealth support model for women scheduled to undergo breast cancer surgery.

Translational Aspect: This project aims to reduce identified evidence-practice gaps relating to breast cancer patients’ preoperative preparation (T2).

OR10 | Reduced Expression of the Protein Phosphatase 2A Regulatory Subunit B55α in Luminal Breast Cancer: Effect on Tumor Progression and Antihormonal Therapy

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Background: Breast cancer is the most frequent female cancer. The serine/threonine protein phosphatase PP2A regulatory subunit B55α shows reduced expression in luminal B (ER+), triple-negative breast cancer patients – a subtype of patients who currently do poorly with standard therapies. Furthermore, work from our group has shown that molecular inhibition of B55α induces a tumorigenic phenotype in 3D cultures of normal mammary epithelial cells. Therefore, we hypothesized that B55α-low ER+ tumors will be more aggressive and be resistant to antihormonal therapies.

Aims: Examine B55α expression in primary breast tumors. To characterize the functional role of B55α loss in tumor aggression and response to antihormonal therapy.

Methods: Immunohistochemistry was performed on patient tumor tissue samples to examine B55α protein expression. B55α protein expression was reduced using shRNA in tamoxifen-sensitive MCF7 and resistant BT474 breast cancer cell lines. Protein lysates were subjected to immunoblotting to determine the expression levels of signaling proteins. Cell migration and invasion was determined using Matrigel trans-well inserts. Growth and proliferation was assessed using resazurin metabolic assays.

Results: The B55α expression was significantly lower in more aggressive luminal B, Her2+ and TNBC compared with luminal A breast tumors. Functionally, shB55α cells showed a marked change in cell morphology with the increased expression of FAK protein and vimentin, evidence of epithelial-mesenchymal transition (EMT). shB55α cells showed significantly increased proliferation, cell migration, matrigel invasion and survival in low serum conditions. Importantly, knockdown sensitized breast cancer cells to PP2A activating drugs, compared with shRNA control cells. While MCF7-shB55α were resistant to tamoxifen, the combination of low-dose PP2A-activating drug and tamoxifen suppressed the growth of resistant BT474 cells, compared to single drug.

Conclusions: The loss of B55α induces an aggressive phenotype and resistance to antihormonal therapies.

Translational Aspect: The current study shows a possible prognostic and therapeutic marker for high-risk luminal breast cancer patients. Clinical trials on tamoxifen resistant patients with the addition of a PP2A activating drug may be a new approach for these patients.

OR11 | The Encompassing Role of Tumor Suppressive Phosphatase in Mammalian Development and Cancer

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Background: Protein phosphatase 2A (PP2A) is a serine/threonine phosphatase, fundamental in the regulation of cellular signaling pathways such as RAS/MAPK and PI3K/AKT. PP2A is composed of a
structural A-subunit, catalytic C-subunit and variable regulatory B-subunit, which directs substrate specificity and subcellular targeting. Recent genome sequencing efforts have identified that deletion of the PP2A-B55α regulatory subunit (encoded by the Ppp2r2a gene) occurs in ~17% of breast cancers, and is associated with poor prognosis.

Aims: Little is known regarding the functional role of Ppp2r2a in normal mammalian physiology or breast tumorigenesis. We have generated the first Ppp2r2a knockout mouse model to address this gap.

Methods: C57/black6 Ppp2r2a knockout mice were generated using CRISPR/Cas9. Mice were sacrificed at various stages of development and pregnancy, with organs and embryos collected. Genotyping was conducted using PCR and gel electrophoresis. Whole mammary gland structure was analyzed by fixing on a slide and staining with Carmin alu, and protein expression of organs analyzed by immunoblotting.

Results: Heterozygous breeding pairs resulted in 274 pups, with 36% wild type and 64% heterozygotes, but no pups with homozygous deletion. Thus, constitutive PP2A-B55α knockout is embryonic lethal, with the developmental block occurring after embryonic day 18.5. Adult heterozygous mice showed decreased PP2A-B55α protein expression in all organs analyzed, especially mammary glands, as well as reduced expression of PP2A inhibitory protein CIP2A and decreased ERK activation. Structurally, heterozygous mammary glands further revealed significantly decreased branching, suggesting a key role for PP2A-B55α in mammary gland morphogenesis.

Conclusions: These results highlight the vital role of PP2A-B55α in late mammalian embryonic development, and provide a powerful model to elucidate the functional role of PP2A-B55α loss in breast cancer, by back-crossing with tumor-susceptible FVB/N mice.

Translational Aspect: T1 – the unique mouse model generated in this study will facilitate the in vivo testing of novel chemotherapeutics in Ppp2r2a low mice with mammary tumors.

OR12 | To Quantitate DNA Damage Repair Pathways in Human Cancers VIA Establishment of a Sensitive and Quantitative Mass Spectrometry-Based Assay

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Background: Breast cancer is a major national and global health concern. While the overall survival for breast cancer has significantly improved, outcome for patients with triple negative (TNBC) or Luminal B subtype tumors remains poor. Recent studies show that some TNBCs display inactivation of key DNA damage repair (DDR) pathways that render them hypersensitive to specific DNA damaging chemotherapy. Whether other breast cancer subtypes also have altered DDR pathways is not known, in part, because an effective tool for quantifying the activity of DDR pathways is not available.

Aims: Develop a robust and sensitive assay to quantitate the activity of DDR pathways in breast cancer.

Methods: DDR pathways are regulated by phosphorylation of key proteins; therefore, we used a targeted proteomics approach to simultaneously quantitate phospho and total levels of DDR proteins in a multiplexed manner, using high-resolution liquid chromatography-tandem mass spectrometry (LC-MS/MS) for parallel reaction monitoring (PRM). To optimize the assay, we utilized human breast cancer cells, BT474, treated +/− bleomycin to induce double-stranded DNA breaks (DSBs) and activate DSB repair pathways, and tested a range of cell lysis, protein digestion and peptide-enrichment strategies.

Results: Using our optimized protocol of sodium carbonate extraction and titanium dioxide enrichment, we identified increased phosphorylation of H2AX, a key marker of DSBs, in response to bleomycin. We further found increased phosphorylation of protein kinase B (AKT) at S123, T307 and S473, checkpoint kinase 2 (CHK2) at Thr386 and the ataxia-telangiectasia mutated (ATM) protein (double phosphorylation at Y175 and S179). In contrast, pThr68-CHK2 and pS367-ATM were reduced.

Conclusions: This was obtained from 1 μg of peptides, and therefore we believe that this assay will be useful for primary patient tissues, which we are beginning to test.

Translational Aspect: Despite improvements in detection and treatment, around 3000 Australian women lose their lives to breast cancer every year. Our study aims to develop a new test to identify which high-risk breast cancer patients are likely to respond to a specific type of chemotherapy.
Conclusions: By identifying and responding to staff barriers with personal, structural and material enablers, we were able to increase research capacity and confidence, translating to better interdisciplinary collaboration and healthcare.

Translational Aspect: Our work enables a more streamlined and cohesive approach to clinician–researcher education, development and support, leading to improved translation of research into practice and the development of practice-inspired research.

OR15 | PSMA PET-CT for Prostate Cancer: Distribution of Disease and Implications for Radiotherapy Planning

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Background: Prostate-specific membrane antigen (PSMA) positron emission tomography (PET) is a novel diagnostic test for the detection of prostate cancer (PC), offering high sensitivity and specificity.

Aims: We aimed to assess the detailed pattern of occult disease distribution and its potential impact on radiotherapy (RT) planning, which has not been investigated previously.

Methods: A total of 179 PSMA PET scans in patients with nil or ≤3 lesions on conventional imaging were retrospectively categorized into three subgroups; Group A – high-risk PC with no prior definitive therapy (n = 34); Group B – prior prostatectomy (n = 75) and Group C – prior radiotherapy (n = 70). The numbers and locations of the PSMA avid lesions were mapped. The PSMA positive lesions were identified subjectively by nuclear medicine physician based on clinical experience and taking into account the recent literature and artifacts.

Results: A total of 893 PSMA avid lesions were identified; at least one lesion was detected in 80% of all scans. A high detection rate was present even at very low serum PSA levels, e.g., at PSA ≤ 0.20 ng/mL in Group B, the detection rate was 46%. Thirty eight percent of studies revealed extrapelvic disease (41%, 31% and 46% in Groups A, B and C, respectively). Almost a third of all studies showed only oligometastases (24%, 36% and 31% in Groups A, B and C, respectively). A large proportion of these (40%) were a solitary lesion.

Conclusions: PSMA PET demonstrated a large number of otherwise unknown metastatic lesions. Therefore, we recommend PSMA PET for more accurate assessment of disease burden in initial staging of high-risk PC as well as for restaging in patients with PSA relapse after primary therapies. Furthermore, a high proportion of oligometastases on PSMA PET provides a prime opportunity to investigate the role of targeted local therapies for oligometastatic PCs.

Translational Aspect: Change in conventional imaging to new imaging modality.

OR16 | A New Landscape of Mutation for Hereditary Nonpolyposis Colorectal Cancer

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Background: Hereditary nonpolyposis colorectal cancer (HNPCC) is an inherited colorectal cancer syndrome representing 5% of all colorectal cancers (CRCs) diagnosed. HNPCC is defined by mutations in four different genes (MLH1, MSH2, PMS2 and MSH6), involved in the mismatch repair (MMR). Individuals can be diagnosed with HNPCC using the Amsterdam criteria (AC), based on their pedigree. But in up to 30% of diagnosed HNPCC (patients meeting AC), no mutations are found in the 4 gene usually tested.

Aims: HNPCC being defined by a faulty MMR pathway, we want to assess the role of the other genes involved in the MMR mechanism in HNPCC.

Methods: To assess the involvement of the other genes associated with MMR, we sequenced a cohort of 248 individuals (Norwegian and Australian) filling the AC but mutation-negative for MLH1/MSH2/ PMS2/MSH6. Using a gene panel of 22 genes involved in the MMR mechanism, we sequenced those patients with next-generation sequencing.

Results: In 7.25% of the individuals (n = 18), mutations in non-tested MMR genes have been found.

Three different variants were identified in the EXO1 (Exonuclease 1) gene, two in the RFC1 (replication factor C subunit 1) gene, three in the RPA1 (replication protein A1) gene and POLD1 (DNA Polymerase Delta 1, Catalytic Subunit) gene. In addition, six newly identified variants have been identified in the four genes usually tested.

Conclusions: These results show that mutations in other MMR genes are found in patients diagnosed with HNPCC (where nonknown mutation has been found). Those genes might be involved in the development of CRC and could be relevant as a diagnostic tool.
Translational Aspect: This research fits on the T1 level of the translational pipeline. It is basic science aiming to identify genes that would be relevant for clinical genetic screening to identify at-risk individuals.

OR17 | Assessing the Impact of Magnetic Resonance Treatment Simulation (MRSIM) on Target Volume Delineation and Resultant Dose to Organs at Risk for Oropharyngeal Radiotherapy

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Background: Magnetic resonance imaging (MRI) is widely used as a complementary imaging modality in target volume delineation for radiotherapy (RT). The aim of this project was to consider how often radiation oncologists would modify their target volumes and anatomical structures with the availability of (a) an MRI scan in a diagnostic position (dMRI) compared to (b) an MRSIM scanned in the planned treatment position (pMRI) for oropharyngeal cancer patients.

Aims: Multimodality imaging is required for complete tumor visualization involving the oropharynx. Images acquired in differing patient positions can lead to image registration issues and potential inaccuracies in tumor delineation.

Methods: This study tested the utility of MRI scanning for 26 oropharyngeal squamous cell carcinoma patients indicated for chemoradiation in their custom radiotherapy immobilization compared to computer tomography (CT) alone. Each patient underwent two separate MRI acquisitions (dMRI and MRSIM) and these scans were made available to the treating Radiation Oncologist in a staged interval for tumor delineation. The resulting tumor volumes were then assessed to compare the modifications.

Results: The post-MRSIM tumor volumes were significantly larger than CT alone. This is attributed to improved visualization of soft tissue invasion. This led to reducing the margin for organ sparing and an increase in dose to the surrounding organs at risk. There was an improvement in image registration efficiency and the standalone image quality of the MRSIM was comparable to a diagnostic quality MRI.

Conclusions: Soft tissue discrimination of the oropharynx is limited with CT alone. It is well recognized that MRI is superior in this regard. We have shown that using a MRSIM results in improvements in registration efficiency, registration quality and a higher degree of RO confidence in target delineation.

Translational Aspect: T1 – Intervention to improve tumor visualization.

T2 – Comparison of methods to demonstrate efficacy and resulting consequences.

T3 – Resultant change in department practice and MRI implementation.

OR18 | HD-SNP Microarray Analysis of the Study 9 High-Risk all Patients – Increased Yield of Important Prognostic Information

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Background: There are limitations in the characterization of genome-wide aberrations in acute lymphoblastic leukaemia (ALL) using current methodologies such as karyotype, extensive fluorescence in situ hybridization (FISH) panels and Reverse transcription polymerase chain reaction (RT-PCR). This is often due to poor metaphase morphology, and the specificity of FISH and RT-PCR panels. High-density SNP microarrays offer improved detection of CNVs gains and losses as well as copy neutral loss of heterozygosity (cnLOH) not detectable using conventional methods in ALL.

Aims: We aim to identify genomic changes using HD-SNP microarray in a cohort of high-risk ALL subjects enrolled. We also aim to assess the value of this technology in a clinical setting to refine risk stratification.

Methods: DNA was extracted from 23 high-risk ALL patients with whole bone marrow taken at diagnosis and/or at relapse. SNP-microarray analysis was performed using the Affymetrix HD platform and analyzed using ChAS software [Affymetrix]. Results were compared to karyotype and FISH results

Results: Analysis by HD SNP-microarray increased detection rate of abnormalities to 100% of the cohort compared to 57% (13/23) for karyotyping and 48% (11/23) for FISH. Important microdeletions, including IKZF1, PTEN, CDKN2A and the fusion forming microdeletions of STIL-TAL1 and CSF2RA-IL3RA were identified by HD SNP-microarray but not detected by karyotype or FISH. Also, numerous regions of cn-LOH were also observed.

Conclusions: SNP-microarray analysis substantially increases and improves the detection of prognostic genomic aberrations in paediatric ALL. This technology complements the current clinical and laboratory techniques (including MRD) for risk stratification and treatment of ALL at diagnosis.

Translational Aspect: NA

OR19 | Targeting Error-Prone DNA Double-Strand Break Repair in Acute Myeloid Leukaemia (AML)

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Conclusions: SNP-microarray analysis substantially increases and improves the detection of prognostic genomic aberrations in paediatric ALL. This technology complements the current clinical and laboratory techniques (including MRD) for risk stratification and treatment of ALL at diagnosis.

Translational Aspect: NA
Validation of Four Triple Negative Breast Cancer–Specific Genes and their Association with Prognosis

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Background: Triple negative breast cancer (TNBC) is one of the most aggressive subtypes of breast cancer with a higher incidence of visceral metastasis, poor prognosis, rapid drug resistance and high rates of disease recurrence. The only treatment options for patients with TNBC are chemotherapy and surgery. There are currently no effective biomarkers for TNBC that can predict outcome or direct more targeted therapies and be easily incorporated into routine pathological procedures making the search for further biomarkers of TNBC essential. Previous studies from our laboratory (Mathe et al., 2015. Sci Rep 5: 15832) have identified four genes (ANKRD30A, ANP32E, DSC2 and IL6ST) that are differentially expressed between normal and breast cancer tissues; and between TNBC and hormone receptor positive breast cancer subtypes. These results were validated in two independent cohorts, with one of these genes (IL6ST) being associated with overall survival in TNBC patients. However, the cohort was very small and underpowered.

Aims: The aim of the current study is to validate the TNBC-specific expression of these genes and to determine their association with survival in a larger cohort.

Methods: Digital Droplet PCR (ddPCR) was used to quantitate the expression of ANKRD30A, ANP32E, DSC2 and IL6ST in a cohort of hormone receptor positive breast cancers and TNBCs as well as a panel of breast cancer cell lines. KM Plotter was used to determine the association of these genes with survival in publicly available datasets.

Results: KM Plotter analysis in 255 publicly available TNBC cases has shown that high expression of ANKRD30A, ANP32E, DSC2 and IL6ST in a cohort of hormone receptor positive breast cancers and TNBCs as well as a panel of breast cancer cell lines. KM Plotter was used to determine the association of these genes with survival in publicly available datasets.

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Conclusion: There is still no suitable treatment options available for TNBC patients. This study has the potential to identify ways in which the TNBC-specific genes ANKRD30A, ANP32E, DSC2 and IL6ST could be utilized to provide effective biomarkers for low cost, diagnostic testing that may give crucial information regarding the risk of metastasis and/or a patient’s response to a particular chemotherapy.

Translational Aspect: It may lead to novel treatment targets for the difficult-to-treat breast cancer subtype, triple negative breast cancer (TNBC).
OR21 | Health Professionals Performing the “5AS” for Smoking Cessation and Prescribing Nicotine Replacement Therapy During Pregnancy: Meta-Analysis of a Systematic Review

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Background: Smoking during pregnancy is the most important remediable risk factor contributing to poor health outcomes for mothers and babies. Health professionals are potentially important providers of smoking cessation care to women during pregnancy.

Aims: Systematically review the literature and identify rates of health providers performing each of the “5AS” for smoking cessation and prescribing nicotine replacement therapy (NRT), among pregnant women who smoke.

Methods: Four databases were searched for quantitative studies using terms for tobacco smoking, pregnancy and health providers’ practices. We included self-report, audit, audio-recorded consultations and women’s reports. Two researchers independently selected studies; a third adjudicated. One researcher completed data extraction; a second coded 20% of articles. A meta-analysis pooled percentages for performing “Ask,” “Advise,” “Assess,” “Assist” and “Arrange,” and prescribing NRT. Variations in measures for the “5AS” resulted in multiple analyses, e.g.: “Ask always/often” and “Ask always/all yes.”

Results: Out of 3933 papers screened, 55 quantitative studies were included: 33 suitable for meta-analysis. Health providers included GPs, Obstetricians, midwives and Aboriginal Health Workers, from 10 countries (seven high-income countries; three low-/mid-income countries). Pooled percentages of studies reporting “always/often” were: “Ask” about smoking (n = 9 papers) 92.7% (95%CI: 86.2, 97.2); “Advise” (n = 7) 90% (CI: 72.5, 99.3), “Assess” (n = 3) 80.6% (CI: 72.8, 88), “Assist” (n = 5) 58.4% (CI: 51.9, 64.8), “Arrange” (n = 6) 32.8% (CI: 20.6, 46.3) and prescribing NRT 12.6% (CI: 3.2, 26.6). Heterogeneity was high for all measures.

Conclusions: Health providers reliably “Ask,” “Advise” and “Assess” pregnant women about smoking. “Assist,” “Arrange” and providing NRT could be improved by training, and incentives or prompts.

Translational Aspect: Pregnancy is an opportunity for health providers to intervene when women may be motivated to stop smoking. It is important to understand which of the “5As” are more likely to be performed, so that gaps in care can be targeted. This T2 study clarifies which elements of smoking cessation care are well delivered and which are lacking.

OR22 | Distress Screening and Management for Australian Cancer Patients: The Evidence Practice Gap and Potential Bridges

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Background: Evidence-based distress screening and management requires use of a brief standardized tool with the purpose to identify if additional assessment and referrals are warranted. Although distress screening is associated with patient benefits, it is unclear what proportion of Australian cancer services currently follows evidence-based screening and management processes. If uptake is low, additional information on the experienced implementation barriers and preferred improvement strategies is required.

Aims: To identify the: (1) proportion of services that follow screening guidelines, (2) barriers to implementation and (3) acceptability of quality improvement techniques to implement screening.

Methods: A total of 217 cancer services were approached to participate in a national cross-sectional survey. To recruit participants, clinic leads received personalized emails and asked to nominate a service representative who was involved in daily patient care to complete a survey. The online survey included 46 items relating to service characteristics, screening practices according to four guideline components and implementation barriers and strategies. The survey was pilot-tested with 10 representatives.

Results: A total of 122 services participated (56%). Only 22% of services always screen for distress with reported gaps across all four guidelines’ components. Common implementation barriers included: lack of resources to action screening results (74%), lack of staff training (66%) and minimal time with patients (66%). Commonly preferred implementation strategies included workshops (69%), educational materials (57%) and computerized support (40%). The majority (50%) preferred multiple strategies as opposed to single-component interventions. Furthermore, 64% indicated interest in improving screening practice.

Conclusions: There is an evidence-practice gap in distress screening with many services not routinely completing distress screening. Training for staff is essential to eliminate barriers to implementing
screening, and this could be delivered via workshops and education materials.

Translational Aspect: This study is translating (T3) evidence-based practice into health services and determining which strategies may be acceptable for future testing.

OR23 | Results of a Survey Investigating Cancer Patients’ Willingness to Travel to Participate in a Clinical Trial

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Background: Despite a need for generalizable research results to guide practice, and the desire of current oncology patients to participate in trials, only 2–5% of oncology patients enrol.

Aims: We aimed to determine the willingness of patients to travel, change location and/or clinician to participate in a clinical trial.

Methods: Patients with a diagnosis of cancer, attending oncology clinics within the Hunter New England local Health District were invited to complete a cross-sectional survey. Demographic questions were followed by a discrete choice experiment (DCE) comprising an introduction and 10 hypothetical scenarios to test the effect of variation in travel time, clinician, treating center, travel cost and type of trial.

Results: Between June 2016 and February 2017, 188 responses were received. Mean age was 60, 46% had early stage disease, 77% were currently receiving treatment and 20% had prior clinical trial involvement. Seventy-eight were willing to participate in a clinical trial in at least one scenario. Factors that decreased the likelihood of interest in clinical trial participation were increasing travel time, change in oncologist and out of pocket expenses. Type of trial (randomized placebo controlled, randomized open label, single arm) did not influence the decision. If the oncologist remained the same and there were no costs, respondents were willing to travel a mean 158 min extra; however, if the oncologist changed and there were additional costs, they were willing to travel a mean of 4 min. If the oncologist changed and there was no cost, they were willing to travel a mean of 62 min.

Conclusions: Respondents expressed interest in clinical trial participation, with willingness to travel in the most likely scenario (change oncologist and pay no additional cost) of 62 min. To facilitate access to clinical trials, clinicians should consider referral within and between institutions.

OR24 | Scale up of a Multistrategic Intervention to Increase Implementation of a Mandatory State-Based Healthy Canteen Policy

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Background: Evidence suggests that dietary habits contribute to the development of chronic diseases, including cancer. As child dietary habits track into adulthood, interventions to improve the dietary intake of children have been recommended. Despite the introduction of school healthy eating policies, studies indicate that the implementation of such policies is poor. A small number of trials have identified strategies that improve policy compliance, however, if the health benefits of food availability policies are to be realized, efficacious interventions need to be effective when implemented at scale, across an entire population of schools.

Aims: The aim of this study is to assess the effectiveness of an intervention to support implementation, at scale, of a healthy canteen policy in Australian primary schools.

Methods: A noncontrolled before and after multistrategic intervention, supporting implementation of a healthy canteen policy was delivered to 173 primary schools located in the Hunter New England region of New South Wales (NSW), Australia. Rogers’ Diffusion of Innovations Theory was chosen to guide the development of the intervention strategies that were adapted from previous successful randomized control trials. The primary trial outcome is implementation of the state-based healthy canteen policy measured through menu audits.

Results: One-hundred and seventy-three schools were eligible to participate. At follow-up, 35% (55/157) of schools compared to 17% (29/168) at baseline (OR = 2.7 [1.6–4.7], P = 0.0003) had menus compliant with the state healthy canteen policy. Intervention effects were maintained 6-month postintervention (33% compliant OR = 2.4 [1.4–4.0], P = 0.001 compared to baseline).

Conclusions: The study provides evidence for public health policy makers and practitioners regarding strategies and modes of support required to facilitate wide-scale adoption and implementation of evidence-based policies to improve child diet.

Translational Aspect: This study translates evidence-based guidelines into wide-spread practice, through delivery, dissemination and diffusion research (T3).

OR25 | Can Hormonal Changes Influence DNA Integrity to Protect us from Colorectal Cancer?

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Background: Despite recent advantages in diagnosis, colorectal cancer (CRC) still has one of the highest incidence rates of all cancers in men and women worldwide. Men are significantly more likely to develop CRC (58%) compared to women (42%) and in both cases, the 5-year survival rate is low, at only 61.3%. Thus, new approaches for the treatment of this cancer are urgently required. Women, who use hormone replacement therapy (HRT) during menopause, are significantly less likely to develop CRC. The fact that women are generally less likely to develop CRC and the beneficial effect of HRT suggests that estrogen may be protective against CRC.

Aims: We hypothesized that estrogen signaling is a critical regulator of intestinal homeostasis of DNA methylation and that loss of this regulation leads to CRC tumorigenesis due to global hypomethylation and increased DNA damage.

Methods: We tested the influence of estrogens on the integrity of DNA in three CRC cell lines (HT-29, Colo-205, Caco-2). Cells were treated with 17-β-estradiol (E2) followed by a treatment with etoposide (DNA damaging agent). The amount of DNA damage was measured using the comet assay.

Results: Our preliminary data showed a significant increase of DNA damage of the cells treated with etoposide alone and no change if they were treated with E2. However, when the cells were pretreated with E2 and then treated with etoposide, there was significantly less DNA damage compared to the positive control (etoposide plus vehicle).

Conclusions: Our data show that estrogen treatment protects human CRC cell lines against DNA damage, a feature of most CRCs.

Translational Aspect: Targeted hormonal treatment has potential to prevent the development of colorectal tumors. We will further investigate this hypothesis in our mouse models.
P1 | The Role of Δ40P53 in the Response to DNA Damage in Breast Cancer Cells

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Background: The tumor suppressor gene p53 is a master regulator in the decision making of cell fate outcome following deoxyribonucleic acid (DNA) damage, by acting as a transcription factor to regulate the expression of a number of target genes involved in the processes of cell cycle arrest, DNA repair or apoptosis. How p53 decides a cell’s fate depends on a myriad of signaling interactions and binding partners, but a more recent mechanism is through the differential expression of the p53 isoforms. Our previous study has found that Δ40p53 is highly expressed in breast cancer, but its role in response to DNA damage in breast cancer is unclear.

Aims: In this study, we investigated the role of Δ40p53 in the response to DNA damage in breast cancer cells.

Methods: We have developed MCF-7 cells that overexpress Δ40p53 (LeGO-Δ40p53) or the empty vector (LeGO). These cells have been treated with different DNA damaging agents and downstream analysis was performed including real-time Polymerase Chain Reaction (PCR), immunofluorescence and functional assays.

Results: In cells that overexpress Δ40p53, there was a significant decrease in select proapoptotic genes in response to certain DNA damaging agents. Furthermore, Δ40p53 expression appeared to have no effect on DNA repair following DNA damage, suggesting that the effects are pathway specific.

Conclusions: These results suggest that Δ40p53 provides an intricate rheostat to the p53-mediated DNA damage response. The response of cells to DNA damage is particularly important for predicting chemosensitivity during treatment of breast cancer.

Translational Aspect: While preliminary, our results suggest that Δ40p53 expression may be an important predictive marker of patient response to different chemotherapeutic agents.

P2 | Δ40P53 Inhibits Migration/Invasion in MCF-7 Breast Cancer Cells

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Background: Breast cancer is the most commonly diagnosed cancer and remains the second cause of cancer-related mortality among Australian women. The tumor suppressor gene p53 is not commonly mutated in breast cancers, indicating that other mechanisms are involved in compromising the canonical function of p53. The p53 gene has been unveiled to produce not only the full-length protein but also a series of isoforms. Our previous study has found that Δ40p53 is the most highly expressed p53 isoform in breast cancers. Additionally, our previous in vitro studies have shown that when Δ40p53 was overexpressed in MCF-7 cells, E-cadherin was upregulated, suggesting a role for Δ40p53 in the maintenance of tissue integrity.

Aims: In this study, our aim was to define the role of Δ40p53 in migration and invasion of breast cancer cells.

Methods: The breast cancer cell line MCF-7 was previously modified to overexpress Δ40p53 via the LeGO vector. Migration and
Phenylacrylonitrile-Based Small Molecules
A Simple, Sensitive and Rapid LC-MS/MS

Aims: We have previously identified a class of phenylacrylonitrile-based small molecules that utilize the aryl-hydrocarbon receptor pathway (AhR) to selectively kill breast cancer cells.

Methods: The MTT (3-[4,5-dimethylthiazol-2-yl]-2,5-diphenyltetrazolium bromide) growth inhibition assay, quantitative Reverse Transcriptase Polymerase Chain Reaction (RT-PCR) and a dual luciferase reporter assay (xenobiotic response element) were exploited to characterize the effect of these compounds on the AhR pathway in breast cancer cell line models.

Results: Our results show that binding to the AhR and subsequent CYP1 activation are necessary for ANI-7 to target breast cancer cells. Both the AhR antagonist CH223191 and the pan CYP1 antagonist alpha-naphthoflavone ameliorated the effects of ANI-7 on our most sensitive breast cancer cell line, MDA-MB-468. We also show that ANI-7 increased expression of the nuclear transporter (ARNT), activated the AhR xenobiotic response element and increased the expression of the phase I metabolizing enzymes (CYP1A1, CYP1A2 and CYP1B1) within 8 h by up to 300-, 27- and 24-fold, respectively. Furthermore, there was no alteration in the expression of either the AhR or SULT1A1 following treatment with ANI-7. Nonsensitive cell lines failed to show these effects.

Conclusions: Our results show that binding to the AhR/ARNT complex and CYP1 activation is important for metabolizing and modifying our compounds to active DNA binding metabolites. This knowledge will build upon our endeavor to selectively target and treat breast cancers in the clinic.

Translational Aspect: This study represents the translation of knowledge from T1 to T2.

P4 | A Simple, Sensitive and Rapid LC-MS/MS Method for the Simultaneous Measurement of Anthracyclines, Cyclophosphamide and Taxanes in Breast Cancer Patients Samples

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Background: Tailoring drug dose for anticancer drugs is known to provide better outcomes by maximizing drug benefit and minimizing toxicity, especially in patients with altered phenotypes such as obesity, advanced age or organ dysfunction. Dose individualization with chemotherapies has been shown to improve patient outcomes and minimize adverse events, yet dose individualization is a challenging task, methodologically and practically. New simple, sensitive, rapid and reproducible methods to simultaneously measure drugs levels in small volumes of patient samples are needed to make it convenient and practical for patients and clinicians.

Aims: To develop a simple, sensitive and rapid LC-MS/MS method for the simultaneous measurement of anthracyclines, cyclophosphamide and taxanes in small volumes of blood samples from breast cancer patients receiving chemotherapy.
**Methods:** Deuterated internal standards in acetonitrile (ACN) are added to small volumes of blood samples (10–50 μL) for extraction. Chromatographic separation is achieved using a Kinetex C18 50 × 2.1 mm, 1.7 μm column with gradient elution of mobile phase starting at 20% ACN with 0.1% formic acid. The compounds are detected by a triple quadrupole mass spectrometer, operating in positive electrospray. Total run time is 5.0 min.

**Results:** The method is linear over a range of 1–500 ng/mL for doxorubicin, epirubicin, docetaxel and paclitaxel, 1–500 μg/mL for cyclophosphamide covering the expected concentrations in patient samples. The method is validated according to regulatory guidelines.

**Conclusions:** A simple, sensitive and rapid Liquid Chromatography-tandem mass spectrometry (LC-MS/MS) method for determination of anthracyclines, cyclophosphamide and taxanes in very small volumes of blood is developed and validated. This methodological improvement will facilitate the chemotherapy dose for each patient to be tailored to provide best response and reduced side effects. This study is funded by National Breast Cancer Foundation Grant.

**Translational Aspect:** This project (T2–T3) will contribute to help dose individualization to maximize anticancer effects and minimize toxicity.

**P5 | Primary Results of a Study to Evaluate a Decision Aid For Women-Offered Neoadjuvant Systemic Therapy for Breast Cancer**

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**Background:** Women with large or highly proliferative operable breast cancer may be offered neoadjuvant systemic therapy (NAST) for reasons including downstaging, prognostication or expanding surgical options.

**Aims:** We aimed to systematically develop and evaluate a Decision Aid (DA) for women who had been offered NAST.

**Methods:** Eligible women who were considered candidates for NAST were enrolled in a single-arm multicenter longitudinal study. Participants completed questionnaires prior to, and on three occasions post-DA. Primary outcomes were feasibility of use, and acceptability to patients and clinicians. Secondary outcomes were patient-reported measures relevant to decision-making.

**Results:** Seventy-nine women were offered study participation and 59 enrolled. Patients were typically well educated, married, had health insurance and were information seekers (mean information needs: 7.5/10; SD 1.84). Fifty-nine of 79 (74.7%) patients who were offered study participation accessed the DA and 49 (79.7%) of those 59 participants reported having read it. Forty-one of 51 (80.4%) participants who completed the post-DA assessment reported that the DA helped them with their decision about NAST. Fifty-one of 59 (86%) participants completed questionnaires prior to, and on three occasions post-DA. Primary outcomes were feasibility of use, and acceptability to patients and clinicians with their decision about NAST. Fifty-one of 59 (86%) participants reported having read it. Forty-one of 51 (80.4%) participants who completed the post-DA assessment reported that the DA helped them with their decision about NAST. Fifty-one of 59 (86%) participants reported having read it. Forty-one of 51 (80.4%) participants who completed the post-DA assessment reported that the DA helped them with their decision about NAST.
Results: Progress and anticipated results: Pilot testing gauged survey length (average = 30 min), language (Flesch-Kincaid grade level = 5.5) and acceptability of content and delivery mode to those affected by cancer. Descriptive analysis of 91 callers will report the proportion and demographics of callers not acting on referrals and the perceived barriers to uptake. For those acting on referrals, the acceptability of the referral will be reported.

Conclusions: Data from the pilot-tested survey will inform our understanding of callers’ referral uptake and unmet need in cancer support services. Understanding referral uptake and acceptability provides the opportunity to develop better pathways and models of care suitable for telephone support lines.

Translational Aspect: This study explores the uptake and acceptability of psychosocial care for people affected by cancer and relates to the T3 translational pipeline in research.

P7 | Perceptions and Enablers of Psychosocial Care Guideline Implementation in a Radiation Oncology Setting: A Pilot Study

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Background: Guidelines for the psychosocial care of adults with cancer recommend that the cancer treatment team invites patients to discuss physical, emotional, relationship, sexuality, existential and spiritual concerns. To develop strategies for implementing these guidelines and improving psychosocial cancer care at a radiation oncology treatment center, there is a need to assess staff and patients’ perceptions of current psychosocial guideline implementation.

Aims: To assess radiation oncology department staff perceptions of psychosocial guideline implementation enablers, and adult cancer patients’ experiences of psychosocial care during radiotherapy.

Methods: Design: Cross sectional
Population and procedures: Radiation oncology department staff survey (distributed via e-mail and hard copy) assessed perceived enablers of psychosocial care guideline implementation across key domains (knowledge and rationale, skills, modeling, monitoring and feedback and maintenance) and awareness of, agreement with and adoption of 11 psychosocial care recommendations. Radiation oncology patient survey (completed on touchscreen tablet in the department waiting room) assessed patients’ experiences of psychosocial care prior to and during radiotherapy. All staff, and adults with cancer receiving at least their second session of outpatient radiotherapy, were eligible.

Analysis: Descriptive

Results: Multidisciplinary clinical and nonclinical staff completed the staff survey (consent rate ~30%; n = 8). All respondents endorsed the domains of skills and maintenance as likely enablers of guideline-adherent psychosocial care. The majority were aware of five, agreed with all and applied 7 of the 11 recommendations. Of the patient respondents (consent rate = 69%; n = 43), over 80% reported patient-centered psychosocial care prior to and during radiotherapy.

Conclusions: These findings are being used to guide the development of psychosocial guideline implementation strategies that target current gaps in guideline uptake identified by radiation oncology staff and patients.

Translational Aspect: This project contributes to reducing identified evidence-practice gaps in psychosocial care for adults in radiation oncology settings (T3).

P8 | Preparation for Radiotherapy: A Cross-Sectional Study Assessing Patients’ Perceptions of the Quality of Procedural Preparation

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Background: It is an ethical imperative that patients are informed about their proposed medical treatment, including any risks and benefits. A tailored patient-centered approach to preparing patients for medical procedures has been shown to improve patient’s physical and psychological outcomes, and increase patient satisfaction and treatment-related knowledge. Despite this, there have been few studies of patients’ experiences of preparation for radiotherapy.

Aims: To assess cancer patients’ experiences of preparation for radiotherapy.

Methods: Adults undergoing radiotherapy were recruited from three Australian clinics. Participants completed the MiPrep survey, which assesses patient’s perceptions of their preparation for medical procedures across two modules: receipt and adequacy of information on a range of preparatory aspects; and overall experience of preparation. MiPrep comprises 37 general and 6 radiotherapy-specific items. Descriptive statistics were calculated and the five items with the highest proportion of respondents reporting they received less information than they wanted was determined.

Results: A total of 196 participants (78%) returned a completed survey. The five preparatory aspects with the highest proportion of patients who received less information than they wanted were: (1) when/how the results of treatment would be received (26%), (2) how long side
effects might last (25%), (3) other patients’ experiences (23%), (4) side effects to report (22%) and (5) the likelihood of treatment working (21%). With regard to their overall experience, our findings suggest that patients perceive their overall experience with preparation for radiotherapy as positive.

Conclusions: This study identified areas where patient preparation could be improved by radiation oncology services. Many patients indicated wanting more information on both the expected and actual outcome of treatment including when this would be known, as well as side effect duration. Additional information provision/support relating to these aspects should be offered.

Translational Aspect: Assessing the quality of patient preparation enables monitoring and improving the delivery of healthcare, thus is translational T2 research.

P9 | Are we Meeting Computed Tomography (CT) and Magnetic Resonance Imaging (MRI) Medical Imaging Outpatients’ Preferences for Preparatory Information? A Cross-Sectional Study

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Background: High technology medical imaging, such as computed tomography (CT) and magnetic resonance imaging (MRI), are common procedures in cancer diagnosis, treatment planning and recurrence monitoring. Preparation for these procedures should include communication of psychosocial, sensory, procedural and behavioral information. The Cancer Institute NSW recognizes patient-centered care as principle to high-quality service delivery; however, no Australian studies have assessed whether imaging patients’ preferences for preparatory information are being met.

Aims: To identify the preparatory information items that are not delivered in accordance with the preferences of MRI and CT medical imaging outpatients.

Methods: MRI and CT outpatients were recruited consecutively in the waiting room of one major public hospital medical imaging department. Participants self-administered a touchscreen computer questionnaire assessing their sociodemographic and scan characteristics, receipt of and preferences for 33 items (k) of guideline-recommended preparatory information. These items addressed the psychosocial (four items), sensory (four items), procedural (11 items) and behavioral (14 items) aspects of care.

Results: Of 317 eligible patients, 280 (88%) consented to participate. The seven items reported as unmet information preferences by more than 25% of participants concerned behavioral (k = 3), psychosocial (k = 2), procedural (k = 1) and sensory (k = 1) aspects of preparation. The most common unmet information preference related to when to expect scan results (33%), followed by how to alert the radiographer during the scan (31%) and how to receive scan results (30%).

Conclusions: Responsiveness to medical imaging outpatient information preferences could be improved across preparatory domains, particularly for information items relating to how and when patients will receive scan results.

Translational Aspect: Despite level I evidence promoting adequate preparatory communication, information provision was not fully patient-centered, highlighting an evidence-practice gap.

P10 | Accuracy and Clinical Applicability of the Intrafraction Motion Review (IMR)

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Background: Stability of the tumor position during radiotherapy is very important for accurate dose delivery. A new monitoring system, Intrafraction Motion Review (Varian Medical Systems), has recently been installed at the Calvary Mater Newcastle (CMN). The system determines the position of fiducial markers (target surrogate) by analyzing two-dimensional (2D) x-ray images acquired at regular intervals during treatment delivery. Clinical use of the system requires investigation of the system’s accuracy and performance.

Aims: This project investigated the accuracy of Intrafraction Motion Review (IMR), limitations arising from its 2D nature and optimal clinical parameters.

Methods: Experiments were performed with a custom anthropomorphic pelvic phantom with three implanted gold seeds and motion introduced using a Hexamotion 5D platform. System performance was analyzed using known position and with an independent system, kilovoltage intrafraction monitoring (KIM, University of Sydney). Imaging dose was determined based on the IPEMB kV-dose calibration protocol for various settings.

Results: For a zero displacement case, IMR demonstrates submillimeter agreement with both the known position (x: −0.25 ± 0.56 mm; y: 0.49 ± 0.08 mm) and KIM reported position (x: −0.09 ± 0.46 mm, y: −0.64 ± 0.20 mm). Static displacement in the anterior–posterior or left–right directions is reported as a sinusoidal motion in the x-axis of the imager. Automatic marker identification is reliable except when markers overlap in an image. Using the imaging settings at CMN, the imaging dose was of the order of 11.86 mGy per fraction or 0.12% of the delivered treatment dose.

Conclusions: IMR is able to accurately report marker positions within the limitations inherent of a 2D system, namely, the inability to
P11  |  A Dosimetric Study on Radiotherapy Machines

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**Background:** While generally offering the same functionality, there are some differences in design and architecture of the clinical linear accelerators of the two main vendors, Varian and Elekta. These differences lead to variations in the dose profiles, which should be considered in quality assurance tasks like dose delivery verification.

**Aims:** The aim of this work is to study dosimetric characteristics of Elekta linear accelerators compared with Varian systems for auditing purposes.

**Methods:** Profiles and field size responses of Elekta and Varian machines were monitored by their corresponding electronic imagers, respectively, iView and aS1000. Then, imager-specific developed models were used to calculate delivered dose inside virtual phantoms for simple square beam deliveries of an Elekta machine. Both models were also used to audit deliveries of two patient treatment cases, Head&Neck (HN) and Post-prostatectomy (PP), from four centers equipped with Elekta machines.

**Results:** Small profile variations were observed in the machine beams, quantified in form of penumbra width. Sharper penumbra was found for the Varian system. A small asymmetry was observed in images from iView and aS1000. Then, imager-specific developed models were used to calculate delivered dose inside virtual phantoms for simple square beam deliveries of an Elekta machine. Both models were also used to audit deliveries of two patient treatment cases, Head&Neck (HN) and Post-prostatectomy (PP), from four centers equipped with Elekta machines.

**Conclusions:** Dosimetric differences between systems, though small, necessitate individualized imager-based models for auditing deliveries from individual systems.

**Translational Aspect:** This project falls into the T1-T2 translational pipeline. Basic research on electronic imager dosimetry methods demonstrated imager-specific modeling for dose verification.

P12  |  MRI Only Anal Canal, Rectum, Cervix and Endometrium Radiation Therapy Planning (MARVEL)

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**Background:** Traditionally, radiation therapy treatment is planned with the use of computed tomography (CT) scans. Due to the improved soft tissue contrast of magnetic resonance imaging (MRI), research has begun focusing on better utilizing MRI for radiation therapy planning. To be able to perform treatment planning on MRI alone, a synthetic CT scan will be created from a MRI scan, in order for the radiation therapy planning systems to be able to calculate the treatment doses to the tumor volume and surrounding organs.

**Aims:** This project aims to determine the feasibility of creating synthetic CT scans from pelvis MRI for treatment planning for complex pelvic cancers.

**Methods:** Forty patients (20 male, 20 female) with histologically confirmed endometrial, cervix, rectal or anal cancer will be recruited through the Calvary Mater Radiation Oncology Department for the trial. Patients will be required to have a planning MRI scan in the treatment position in their routine planning CT scan. Synthetic CT scans will be created from the MRI scans and analyzed against the patient’s CT scan to determine the feasibility of planning on the synthetic CT scan alone.

**Results:** The protocol is currently undergoing research ethics committee review. The results will respond to the end points as specified in the study protocol; to demonstrate the dosimetric agreement between CT and synthetic CT for radiotherapy treatment planning; to demonstrate the HU comparison of conventional CT and synthetic CT; and to demonstrate the ability to perform image guidance on treatment with the synthetic CT.

**Conclusions:** The outcomes of this study are technical in nature. This study aims to demonstrate the dosimetric agreement between conventional CT and synthetic CT for radiation therapy planning of complex pelvic cancers. This study aims to improve radiation therapy treatment for patients by better utilizing MRI for radiation therapy treatment planning, in order to improve patient treatment and outcomes.

**Translational Aspect:** The research is at stage T2 of the translational pipeline. The project aims to test the effectiveness of the synthetic CT creation process.

P13  |  An Intercenter Intensity Normalization for Prostate T2-Weighted MRI

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**Background:** Traditionally, radiation therapy treatment is planned with the use of computed tomography (CT) scans. Due to the improved soft tissue contrast of magnetic resonance imaging (MRI), research has begun focusing on better utilizing MRI for radiation therapy planning. To be able to perform treatment planning on MRI alone, a synthetic CT scan will be created from a MRI scan, in order for the radiation therapy planning systems to be able to calculate the treatment doses to the tumor volume and surrounding organs.

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**Results:** The protocol is currently undergoing research ethics committee review. The results will respond to the end points as specified in the study protocol; to demonstrate the dosimetric agreement between CT and synthetic CT for radiotherapy treatment planning; to demonstrate the HU comparison of conventional CT and synthetic CT; and to demonstrate the ability to perform image guidance on treatment with the synthetic CT.

**Conclusions:** The outcomes of this study are technical in nature. This study aims to demonstrate the dosimetric agreement between conventional CT and synthetic CT for radiation therapy planning of complex pelvic cancers. This study aims to improve radiation therapy treatment for patients by better utilizing MRI for radiation therapy treatment planning, in order to improve patient treatment and outcomes.

**Translational Aspect:** The research is at stage T2 of the translational pipeline. The project aims to test the effectiveness of the synthetic CT creation process.
Background: Intensity normalization should be biologically interpretable and replicable, and should also have a similar distribution for the same tissue in different patients. It should not result in the loss of information, either due to pathology or abnormality. The use of robust intensity normalization methods that are biologically interpretable can improve the diagnosis of prostate cancer. This paper evaluated the effects of using different biological references (peri-prostatic fat, bone marrow and bladder urine) and local peak finding on ratio-based intensity normalization of T2WI images. In addition, the normalization methods were qualitatively and quantitatively evaluated in images from prostate cancer patients.

Aims: The aim of this study is to evaluate the efficacy of different biological reference for intercenter normalization of prostate T2WI.

Methods: A total number of 163 prostate cancer patients were recruited from two centers. The data from Center 1 composed of 140 T2WI and the data from Center 2 was composed of 23 T2WI images. After normalization, the intercenter performance was evaluated for each of these methods using both histogram analysis and Canberra dissimilarity index.

Results: Probability density function (PDF) of images before and after normalization demonstrated bone marrow gave the best performance for ratio-based intensity variation and thus the worst performance for intensity normalization. In addition, intensity variation of the prostate tissue gave the similar results to PDF.

Conclusions: Normalization by peri-prostatic fat and red marrow of femoral bone allows the minimization of intensity variation and increase confidence in relative difference in cancer expression and quantitative analysis. The biological reference reproducibility on MRI images at different scan times is a critical parameter for normalizing T2WI accurately.

Translational Aspect: This study falls into the T2 translation pipeline.

P14 | Voxel-Based Diffusion Tensor Imaging (DTI) Features in Patients with Prostate Cancer

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Background: Diffusion tensor imaging (DTI) is an extension to diffusion-weighted imaging (DWI) to evaluate macro- and microstructures of prostate tissue architecture. DTI yields a $3 \times 3$ symmetric matrix (tensor) that represents the Apparent Diffusion Coefficient (ADC) values in at least six noncollinear directions. The diagonal elements of the tensor represented by eigenvalues ($\lambda 1 \geq \lambda 2 \geq \lambda 3$) can be fitted to a 3D eccentricity ellipsoid.

Aims: The aim of this work is to investigate the efficacy of DTI by extracting voxel-based DTI features of prostate cancer patients for subsequent computer-aided diagnosis (CADx).

Methods: DTI images of five prostate cancer patients were utilized. Twelve quantitative features were extracted from DTI images based on eigenvalues of the DTI including: mean diffusivity (MD), fractional anisotropy (FA), diffusion mode, axial diffusivity (AD), volume diffusivity (VD), volume ratio (VR), linear, planar and spherical anisotropy (CL, CP and CS, respectively), radial anisotropy (RA), exponential MD decomposition (EXP) and trace map. A total of 16 malignant ROIs in the peripheral zone (PZ) and nine healthy regions of interest (ROI) were also randomly chosen within the remaining healthy PZ with the aid of an experienced radiologist. The P-value derived from t-test was used to assess the diagnostic significance of the above features. In addition, linear support vector machine was used to calculate the performance of these features for discrimination of cancerous and healthy tissues.

Results: The average diffusivity in cancer tissue on MD, AD, RD, VD, CL, CP, RA and EXP maps was significantly lower than healthy tissue ($P < 0.05$).

Conclusions: Anisotropy values in cancer part increased notably on FA and CS ($P$-value < 0.01).

Translational Aspect: This study falls into the T1 translation pipeline.

P15 | Extracellular Vesicles Small RNA-seq Data Show Potential Functional Metastatic Prostate Cancer Biomarkers

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Background: Prostate cancer has one of the highest incidence rates of all cancers in Australia. Most prostate cancers exhibit a slow progression toward metastasis or are in fact indolent, meaning 5-year survival rates are high. However, current treatments for localized disease have devastating effects on quality of life and current biomarkers are not accurate enough leading to many men with indolent disease being unnecessarily treated. Extracellular vesicles (EVs) are a promising avenue for finding noninvasive cancer biomarkers. EVs are small spherical shaped vesicles, which are secreted from their tissue of origin and recoverable from most bodily fluids including urine and plasma, making them ideal candidates for biomarker discovery.

Aims: To identify new biomarkers in a noninvasive manner, and understand the role of EV ribonucleic acid (RNA) in metastasis.

Methods: EVs from a panel of 13 prostate cell lines were investigated using small RNA-seq to identify prognostic and or diagnostic biomarkers.
Results: Analysis showed 143 transcripts with different abundance in EVs when classified into the four groups of normal, prostate cancer, metastasis and benign prostatic hyperplasia. Interestingly, there was an abundance of miRNAs comprised within this data set at 55%.

Conclusions: We have demonstrated that potential prostate cancer biomarkers can be found using small RNA-seq. In particular, there was a group of miRNAs that show promising signs of a biomarker, as they were all downregulated in the metastatic group. These miRNAs have been shown to be involved in cell growth, cell cycle, migration, invasiveness, apoptosis and clonability in prostate cancer tissue and cell lines. Further work involving these miRNAs functions, relating to metastasis, will also have the potential to identify novel therapeutic targets as well as biomarkers.

Translational Aspect: This work is in the T1 stage, with the potential to be translated to prognostic, diagnostic biomarkers and/or therapeutic targets in the future.

P16 | Defining the Molecular Footsteps of High-Grade Serous Ovarian Cancer

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Background: High-grade serous ovarian cancer (HGSOC) lacks specific symptomatology with > 80% of diagnosed cases occurring in post-metastatic phases. Due to this very reason, the early stages of HGSOC are uncharacterized. On an average, HGSOC tumors have ~50 mutations and thousands of copy number variations. The order of occurrence of these changes is currently unknown. Women with germ line BRCA1/2 mutations have a genetic predisposition to ovarian cancer. Current prophylactic treatment is surgical removal of ovaries and fallopian tubes before cancer occurrence. Such removed tissue is a great source in molecular characterization of early-stage HGSOC.

Aims: To decipher the molecular changes between normal fallopian tube epithelium (nFTE), the HGSOC-precursors and the HGSOC, thereby charting the evolution of HGSOC. This is pivotal for the early detection and prevention of the disease.

Translational Aspect: Upregulated Wnt signaling markers can serve as a precise early detection tool using pap smear deoxyribonucleic acid analysis or transvaginal lavage (translational pipeline T1).

P17 | Apoptosis-Regulating Long Noncoding RNAs in Melanoma

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Background: There is increasing evidence demonstrating that long noncoding ribonucleic acid (IncRNAs) play important roles in the pathogenesis of cancer. However, the potential significance of IncRNAs in regulating the apoptotic response in melanoma cells remains less understood.

Aims: To investigate the functional significance of IncRNAs in regulating the sensitivity of melanoma cells to apoptosis.

Methods: We generated melanoma cell sublines with acquired resistance to the Mcl-1 inhibitor UMI-77 and TNF-related apoptosis-inducing ligand (TRAIL) through prolonged exposure of melanoma cells to the agents. Comparative RNA sequencing analysis was carried out to identify differentially expressed IncRNAs in the resistant cells and their corresponding parental counterparts. RNA pulldown followed by mass spectrometry was employed to interrogate proteins that bound to identified IncRNAs. Combined knockdown and overexpression were used to examine the functional significance of the candidate IncRNAs and proteins.

Results: Comparative RNA sequencing analysis identified the IncRNA OVAAL as one of the most significantly upregulated IncRNAs in melanoma cells with acquired resistance to UMI-77 and TRAIL. Inducible knockdown of OVAAL sensitized resistant melanoma cells to apoptosis induced by UMI-77 or TRAIL. RNA pulldown and mass spectrometry data showed that OVAAL physically interacted with polypyrimidine tract binding protein 1. This resulted in increased expression of the antiapoptotic Bcl-2 family protein Mcl-1 that was critical for resistance to apoptosis induced by UMI-77 or TRAIL.

Conclusions: The IncRNA OVAAL plays an important role in resistance of melanoma cells to apoptosis triggered by stimuli activating intrinsic and extrinsic apoptotic pathways.
P18 | Role of Ion Channels in Melanoma

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Background: Melanocytes are cells derived from the neural crest region that during development, migrate to different parts of the body, including skin. Due to their lineage, melanocytes are believed to retain certain neuronal features. Ion channels are pore-forming, integral membrane proteins that allow the passive transport of various ions across the cell membrane along their electrochemical gradient. In addition to their role in excitatory cells and normal physiological functions, ion channels are involved in all hallmarks of cancer.

Aims: In this study, we used a systematic approach to identify novel ion channels with a potential role in melanoma development and progression.

Methods: Four datasets from Gene Expression Omnibus (GEO) were analyzed. Each dataset represented differentially expressed genes between two different stages of melanoma: benign nevi versus primary melanoma (GSE3189), primary melanoma versus metastatic melanoma (GSE59455), normal melanocytes versus metastatic melanoma (GSE29377) as well as benign nevi versus metastatic melanoma (GSE46517). Commonly upregulated ion channels among all four datasets were identified and considered for functional enrichment analysis using a bioinformatics resource, DAVID (Database for Annotation, Visualisation and Integrated Discovery).

Results: Collective analysis of the results from GEO, pathway analysis by DAVID and relative mRNA abundance in a panel of melanoma cell lines led to the identification of glutamate ionotropic receptor N-methyl-D-aspartate (NMDA)-type subunit 2C (GRIN2C) as a novel candidate for further investigation in this study. Preliminary results revealed that GRIN2C is upregulated in a subset of melanoma cell lines and that it plays a potential role in promoting melanoma cell survival and proliferation.

Conclusions: Our systematic approach unravels a potential role for GRIN2C ion channels in pathogenesis of melanoma.

P19 | Using Peripheral Blood Immune Profiles to Monitor Patient’s Response to Pembrolizumab

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Background: The advent of immunotherapy for metastatic melanoma has transformed the treatment landscape. Programmed death-1 (PD-1) is an immune-inhibitory receptor expressed by chronically stimulated CD4 and CD8 T cells after activation. The advent of immune checkpoint blockers such as Pembrolizumab (anti-PD-1) has transformed melanoma treatment by blocking PD-1 on the activated T cells, improving overall survival, progression-free survival and overall response rates. However, some metastatic melanoma patients do not have a durable response and can present with upfront primary or longer term secondary resistance to anti-PD1 immunotherapy.

Aims: The aim of this study was to develop a peripheral blood immune profile to monitor the changes in effector and exhausted CD4 and CD8 T cell populations, which, when combined with RECIST score, reflects the response to pembrolizumab.

Methods: Whole blood, sequentially collected, at every treatment cycle for up to 12 months from 20 metastatic melanoma patients receiving Pembrolizumab at the Calvary Mater Hospital, Newcastle. The following markers were assessed by flow cytometry on a BD Biosciences Fortessa II: CD3, CD4, CD8, CD45, CD45RA, FoxP3, IL-9, HLA-DR, CD25, CD274, CD38, CXCR6 and PD-1. Number of cycles received per patient ranged from 2 to 26 with an medium of 19 cycles of pembrolizumab at the commencement of blood collection.

Results: Patients with confirmed relapse during the 12 months of blood collection, all presented with four distinct markers: PD-1, HLA-DR, CD38 and CXCR6 on CD4+ T cells and disease progression was confirmed by RECIST. All “relapse” markers were not present in responders.

Conclusions: This will lead to the outcome of detecting resistance and earlier consideration other treatment options for patients who do not respond to anti-PD1 immunotherapy.

Translational Aspect: The results of this study indicate that blood immune profiles can be further developed as real-time biomarkers of anti-PD1 resistance.

P20 | A Genomic Editing Approach for Purification of Intact Quiescent Cancer Cells

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Background: Recurrent and metastatic cancer is closely associated with cancer cell quiescence, a state at which cancer cells exit the cell cycle and are reversibly arrested in G0 phase. Quiescent cancer cells are inherently resistant to cell death and refractory to therapeutic drugs. However, the mechanisms responsible for the resistance remain largely undefined. This is closely associated with the lack of
Understanding of their biological properties as a consequence of technical hurdles in the isolation and analysis of viable quiescent cells. Nevertheless, it is known that quiescent cells are characteristically negative for the proliferation marker Ki67 and express high levels of the cyclin-dependent kinase (CDK) inhibitor p27.

Aims: To develop a CRISPR/Cas9-based approach for accurately purifying quiescent cancer cells.

Methods: We have developed a CRISPR/Cas9-based system to fuse a green fluorescent protein (EGFP) gene with endogenous CDKN1B, the gene encoding p27, and a red fluorescent protein (mCherry) gene with endogenous MKI67, the gene encoding Ki67 in the genome of human melanoma cells.

Results: We successfully inserted and fused the EGFP cDNA with endogenous CDKN1B and the mCherry cDNA with endogenous MKI67 using the CRISPR/Cas9 system concurrently. We subsequently isolated viable p27(high)/Ki67(low) (quiescent) melanoma cells using Fluorescence-Activated Cell Sorting (FACS). The quiescent state of these cells was confirmed by dual nucleic acid staining (DNA with Hoechst 33342, and RNA with Poronin Y).

Conclusions: The system provides us with an exceptional tool for further characterization of the biological properties of viable quiescent melanoma cells.

P21 | Oncogenic Upregulation of the Long Noncoding RNA MAFG-AS1

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Background: Through bioinformatics analysis of publically available ribonucleic acid (RNA) sequencing datasets, we found that the noncoding RNA MAFG-AS1 was commonly upregulated in diverse types of human cancers compared with corresponding normal tissues.

Aims: To examine the functional significance of MAFG-AS1 upregulation in the pathogenesis of cancer.

Methods: Human cancer cell lines carrying an inducible MAFG-AS1 shRNA system in response to doxycycline were used as tools to investigate the effect of MAFG-AS1 silencing on cell proliferation and survival. The results were confirmed by overexpression of MAFG-AS1. Comparative RNA sequencing analysis was carried out to identify potential downstream targets of MAFG-AS1. RNA pulldown and RNA immunoprecipitation were used to interrogate RNAs and proteins binding to MAFG-AS1. The roles of identified MAFG-AS1 binding partners in MAFG-AS1-mediated cell survival and proliferation were tested by combined knockdown and overexpression.

Results: Our results confirmed that MAFG-AS1 was frequently upregulated in cancer cells. Functional investigation revealed that MAFG-AS1 promoted cancer cell survival and proliferation. This was closely associated with downregulation of the transcriptional target of p53, tripartite motif family-like 2 (TRIML2) and repression of the tumor suppressive microRNA (miR), miR-29a-3p.

Conclusions: IncRNA MAFG-AS1 plays an important role in cancer development and progression. This is, at least in part, due to its inhibitory effect on TRIML2 and its role as a competing endogenous RNA (ceRNA) to repress miR-29a-3p.

P22 | Investigating the Genetics of the Development of Lung Cancer

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Background: Lung cancer (LC) is the leading cause of cancer-related morbidity and mortality in Australia and worldwide. Cigarette smoking accounts for 80–85% of all LC cases. It alters the expression of genes responsible for normal cellular function. The current diagnostic techniques fail to detect LC at an early stage due to the poor understanding of genetic events leading to development of LC. Conducting genome-wide studies can identify novel mutations responsible for neoplastic changes that could be used as diagnostic markers.

Aims: Identifying genetic alterations linked to the development of LC using long-term tobacco carcinogen/cigarette-smoked wild-type mouse models and validate them in short-term mouse models and human samples.

Methods: A/J mice were administered a tobacco carcinogen, NNK (4-(Methylnitrosamino)-1-(3-pyridyl)-1-butanone) and exposed to cigarette smoke (CS) for varying periods. Whole genome sequencing (WGS) is being performed on tumor and nontumor lung tissue, blood cells and tails from the long-term model and the results will be validated in short-term mouse models and human samples using targeted sequencing.

Results: Our group has established a novel short-term mouse model where 100% of mice exposed to NNK and 8-weeks of CS followed by 8-weeks of air rest develop adenomas resembling human bronchoalveolar adenomatous hyperplasia. In our long-term models, mice exposed to NNK and 36-weeks of CS followed by 27-weeks of air rest developed large adenocarcinomas resembling human bronchoalveolar carcinomas.

Conclusions: Our novel mouse model recapitulates the crucial pathological and inflammatory features of human LC. We anticipate that data from WGS would identify genetic alterations in neoplastic stages of LC that can be developed into early diagnostics.

Translational Aspect: Our interrogation of clinically relevant models will identify genomic mutations that occur during the initiation of tumor development that can be translated into early diagnostic tests for LC fitting into T1 phase of translational research pipeline.
P23 | Identification of a New Mechanism for Controlling Acute Myeloid Leukaemia Cell Survival

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**Background:** Acute myeloid leukaemia (AML) is the most common acute leukaemia in adults, and accounts for ~30% of leukaemia diagnoses in Australia. The 5-year survival rate for AML is 24%, and the majority of patients who enter remission will relapse. Primary refractory disease occurs frequently in AML, with 33% of patients aged < 65 years, and 57% of patients over 75 years failing to achieve complete remission after induction therapy. Overexpression of brain and acute leukemia, cytoplasmic (BAALC) is associated with decreased overall and relapse-free survival, as well as increased incidence of primary refractory AML. We have previously shown that BAALC overexpression increases AML cell proliferation and decreases cell sensitivity to chemotherapeutics. However, the precise cellular functions controlled by BAALC remain unknown.

**Aims:** The main aim of this study was to identify how BAALC overexpression controls AML cell proliferation and survival.

**Methods:** BAALC was overexpressed in a panel of AML cells, and reciprocal communoprecipitations were performed to identify proteins that interact with BAALC. To elucidate the cellular functions mediated by these interactions, the expression of each interacting protein was reduced via siRNA transfection. Following this, effects on proliferation and survival were examined (cell counts, resazurin and Annexin assays).

**Results:** We have identified four novel proteins that interact with BAALC, and have shown that some of these interactions are responsible for the BAALC-mediated control of AML cell survival and proliferation.

**Conclusions:** BAALC is a potential target for the treatment of AML. Since BAALC has restricted expression in normal cells, drugs that target BAALC or its binding partners may present more cancer cell-specific effects and less toxicity than current therapies.

**Translational Aspect:** This T1 research has identified a new target for the treatment of AML. Further examination of this target may be useful therapeutically as a new strategy for the treatment of primary resistant AML.

P24 | Evaluation of Integrating HD-SNP Microarray into the Workflow for CLL and MM: Challenges and Culture Changes

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**Background and Aims:** We present our validation process of a high-density (HD) single nucleotide polymorphisms (SNP) microarray platform for the clinical investigation of chronic lymphocytic leukaemia (CLL) and multiple myeloma (MM).

**Methods:** A pilot study was performed on 15 MM patients, 15 CLL patients and 2 controls. Deoxyribonucleic acid (DNA) was extracted from whole bone marrow (BM) after CD138+ enrichment in MM cases or from whole (BM) or peripheral blood (PB) for CLL.

1. HD-SNP microarray was performed using the Illumina CytoChip 850K platform; data were analyzed using the BlueFuse software (Illumina). Results were compared to FISH.
2. An external validation of the analysis process was undertaken at IGNEZ.

**Results:** Initial blinded concordance with FISH probe calls was 94.4%, which increased to 99.5% after review of discordant results. Copy number changes were observed down to a sensitivity of 10% clonal involvement and the practical resolution was determined to be 156 kb in size. The average difference in the estimation of clonal involvement was 15.5%. Identification of risk associated genomic features improved stratification in 5/15 CLL and 5/15 MM cases.

**Conclusions:** SNP-microarray analysis has the ability to substantially increase and improve the detection of prognostic genomic aberrations CLL and MM. This technology complements the current clinical and laboratory techniques (including translocation FISH and MRD) for risk stratification and management of patients with CLL and MM at diagnosis. While the clinical utility speaks for itself, the implementation of IT systems, billing and reporting systems was by far the most challenging aspect of this validation study.

P25 | Diet Quality and Cancer Risk and Mortality in Adults: A Systematic Review of Epidemiological Studies

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**Background:** Measures of overall diet quality have been linked to chronic disease whereby a higher diet quality score is associated with lower risk. However, systematic reviews have not evaluated relationships between a-priori defined diet quality scores and adult cancer risk and mortality.

**Aims:** The aims of this systematic review were to (1) describe diet quality scores used in cohort or cross-sectional research examining cancer outcomes, and (2) describe associations between diet quality scores and cancer risk and mortality.

**Methods:** The protocol was registered in Prospero and a systematic search using six electronic databases was conducted to December 2014. Records were assessed for inclusion by two independent reviewers and quality was evaluated using a validated tool.

**Results:** Sixty-four studies met inclusion criteria from which 55 different diet quality scores were identified. Of the 35 studies investigating diet quality and cancer risk, 60% (n = 21) observed a relationship between higher diet quality scores and lower cancer risk. Results suggest no relationship between diet quality and overall cancer risk but inverse associations were found for diet quality scores and risk of site-specific cancers, specifically post-menopausal breast, colorectal, and head and neck cancer. No consistent relationships between diet quality scores and cancer mortality were found.

**Conclusions:** Diet quality appears to be related to site-specific but not overall cancer risk in adults. The relationship with cancer mortality is less conclusive, suggesting that additional factors impact overall cancer survival. Development of a cancer-specific diet quality score for application in prospective epidemiology and in public health is warranted.

**Translational Aspect:** T3: Implementation-based research leading to system wide change

This review may lead to more evidence-based nutritional assessment and management of cancer patients.

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**P26 | Smoking Cessation Care for Patients with Cancer in NSW Hospitals**

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**Background:** Smoking status is a powerful clinical risk indicator for patients with cancer and merits the full attention of the healthcare team and the patient. However, limited evidence suggests that smoking cessation care for patients is typically poor. There is little rigorous research on the extent to which cessation support is offered to Australian patients with cancer.

**Aims:** To identify the degree to which hospitals support the delivery of routine smoking cessation care in oncology, and describe staff attitudes to smoking cessation care.

**Methods:** All staff involved in the care of oncology patients (including medical, nursing and allied health) in seven NSW hospitals were invited to complete a survey. The survey assessed: the delivery of smoking cessation care; strategies used to encourage smoking cessation care and staff attitudes toward smoking cessation care for patients with cancer.

**Results:** Of the 193 respondents (response rate: 31.2%), the highest proportion asked patients about their smoking status (approximately 48% of all inpatients and 43% of all outpatients). The most common strategy to encourage smoking cessation care was to include a specific section on the patient file to denote their status as a smoker (approximately 33%). Respondents indicated that smoking cessation care was clinically appropriate; yet most reported that they lacked skills to deliver such care.

**Conclusions:** Although respondents acknowledged the importance of smoking cessation care, its delivery was low, particularly when patients were referred to follow-up care and across outpatient settings. The limited delivery of smoking cessation care might reflect inadequate resources, including training and time. These findings collectively suggest the importance of a multimethod approach to promote smoking cessation care that addresses the needs of individual clinicians and the services they are affiliated with.

**Translational Aspect:** This research examines the capacity of oncology units to implement smoking cessation care routinely and as such is T3 translation research.

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**P27 | The Indigenous Counselling and Nicotine (ICAN) Quit in Pregnancy Intervention – Preliminary Findings of Changes in Health Providers’ Knowledge and Practices**

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**Background:** Aboriginal pregnant women have a high smoking prevalence (45%). Health providers (HPs) report lack of knowledge, skills and confidence to effectively manage smoking during pregnancy. The ICAN Quit in Pregnancy intervention aimed to improve HPs’ management of smoking in Aboriginal pregnant women with webinar training, free oral nicotine replacement therapy (NRT) and an educational resource package. The intervention design was based on formative research, a
Mothers Aunty’s Maternal Aboriginal Recruitment and Consulting for a National Study

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P28 | Mothers Aunty’s Maternal Aboriginal Smokers (MAMAS) Study

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Background: Aboriginal women are 3.6 times as likely to smoke across the life span including during pregnancy compared to non-Aboriginal women (46% vs 12%). Smoking when pregnant has a significant and widespread impact on infant and child health and subsequent health across the life span. To have greater impact anti-tobacco messages and resources need be culturally and context specific to Aboriginal communities. By supporting Aboriginal women to quit smoking when pregnant, both the woman and baby have greater health across the lifespan.

Aims: To evaluate the trends for changes in HPs’ knowledge and practices in managing smoking among pregnant Aboriginal women, after the ICAN QUIT in Pregnancy intervention.

Methods: A step-wedge cluster randomized pilot study with six Aboriginal Medical Services. HPs completed a cross-sectional survey pre- and postintervention. Knowledge was measured using a composite score of 24 false/true statements. Practices were measured using a 5-point Likert scale (Never-Always) for 12 smoking cessation care components.

Results: Forty-four health providers completed the pretraining survey and 20 completed the posttraining survey: response rate 55% and 25%, respectively. Knowledge score improved slightly from 78% to 84% (mean difference 5.85%, 95% CI – 0.46, 12.17%). The proportion of HPs reporting “Always and Often” providing cessation support changed nonsignificantly from 48% to 60% (difference 12.3%, 95% CI – 22.7%, 47.3%). Rates of “Never” prescribing NRT remained unchanged (16% and 20%, respectively, difference 4.1%, 95% CI – 43.6%, 51.7%).

Conclusions: This multicomponent intervention may show a trend for improving HPs’ management of smoking in Aboriginal Medical Services. Despite a focus on training and resources to improve NRT prescription rates, this outcome did not show a trend for improvement.

Translational Aspect: This is a T2–T3 research using knowledge gained from previous research, and evidence-based approaches to test an intervention within Aboriginal Medical Services. This pilot study will further inform a larger clustered randomized controlled trial.

P29 | Recruiting and Consulting for a National Evidence-Based Trial on Smoking Cessation Care for Pregnant Aboriginal and Torres Strait Islander Women: The SISTAQUIT(TM) Experience

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Background: Pregnancy is an important window of opportunity to help smokers quit. Evidence-based, culturally appropriate smoking cessation care (SCC) is required to lower smoking prevalence (45%) among pregnant Indigenous women. Supporting Indigenous smokers to assist quitting (SISTAQUIT), a cluster randomized controlled trial at Aboriginal Medical Services (AMS), compares normal care versus culturally appropriate SCC training to health providers (HPs) to determine if training improves quit outcomes. Little is known about the most effective strategies to recruit AMS research sites. Communication and
consultation processes require respectful, culturally appropriate engagement with local protocols, management and leadership.

**Aims:** To describe the national recruitment of sites and consultation phases for the SISTAQUIT trial.

**Methods:** SISTAQUIT is currently consulting with peak bodies and recruiting 30 AMS to participate in this opportunity to access whole of service HP training to improve quit outcomes for pregnant mothers. A literature review, the NSW Health Whole of Health communication strategy, national ethical guidelines and experiences from the pilot study informed recruitment strategies for enlisting AMS as research sites. Recruitment strategies included identification of AMS via web-based search strategies, mail-out of an expression of interest package to CEOs in successive waves to targeted states and territories, follow-up phone calls and emails to services, notices in newsletters, attendance and presentations at regional and state seminars, and use of social media. Logs were kept of the response rates of AMS using each type of strategy, and analyzed by state and territory.

**Results:** Preliminary results of the recruitment strategy and the communication and consultation process will be reported to help future trials ascertain appropriate, effective and time-efficient methods of recruiting AMS for cluster trials.

**Conclusions:** A wide variety of communication approaches were required to recruit AMS facilities to participate in the SISTAQUIT trial.

**Translational Aspect:** The SISTAQUIT recruitment experience enacts health communication strategies (T2).

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**P30 | The Growth and Empowerment Measure Among Aboriginal Pregnant Women Recruited for Ican Quit in Pregnancy**

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**Background:** Reducing tobacco smoking during pregnancy is a focus to meeting the “Closing the Gap” target of halving the gap in mortality rates for Indigenous children under five within a decade. Approaches to encourage and empower Aboriginal women are crucial to reducing the prevalence in smoking during pregnancy. Empowerment approaches to Aboriginal health interventions connect with the holistic definition of Aboriginal health and have been increasingly interwoven in health interventions, programs and across Australia.

**Aims:** To establish a baseline for Growth and Empowerment (GEM) of Aboriginal pregnant women accepting smoking cessation support during antenatal care.

**Methods:** Pregnant women recruited to the ICAN QUIT in Pregnancy pilot study completed baseline survey, and follow-up surveys (4 and 12 weeks) containing a GEM measure. The GEM includes a 14-item Emotional Empowerment Scale, 12 scenarios and the Kessler 6 Psychological Distress Scale (K6) supplemented by two questions assessing frequency of happy and angry feelings. The GEM measures domains of: inner peace, self-capacity, healing, enabling growth, connection and purpose. The survey also measured sociodemographic characteristics, smoking status, measures of nicotine dependence, home smoking rules, intentions to quit smoking and previous quit attempts.

**Results:** Data collection will end in September 2017. Twenty-three Aboriginal women have been recruited to the study and completed a baseline GEM. Preliminary results will be presented with a focus on baseline GEM scores and their association with demographic characteristics, analyzed for the first time in Aboriginal women during pregnancy.

**Conclusions:** The GEM has not yet been used with Aboriginal pregnant women or smokers. This research privileges the experiences of Aboriginal women through a culturally appropriate measure of Aboriginal health and well-being.

**Translational Aspect:** This is a T2–T3 research build on previously validated measure for Aboriginal and Torres Strait Islander health and well-being. The results of this will inform a larger clustered randomized controlled trial.
online menu planning and decision support tool. To encourage uptake of the online program, services were provided with face-to-face training and follow-up telephone support. The primary outcome is the mean number of food groups within a week-long menu that meet dietary guideline recommendations at 12-months follow-up.

**Results:** Fifty-four (33%) of eligible services provided consent. At baseline, services were compliant with an average of 1.13 (SD 1.23) (out of 6) food groups. No service had a menu compliant with all six food groups; 4% of services were compliant with recommended serves of vegetables, 9% meat and alternatives, 28% fruit, 30% breads/cereals, 35% dairy and 7% discretionary foods.

**Conclusions:** Baseline findings confirm the lack of implementation of dietary guidelines in the childcare setting, leaving children at-risk of developing cancer and chronic disease. Given increasing use of web-based information technology to guide activities of community organizations, application of this technology to support adherence is timely. The trial will inform future interventions, and has the potential to be widely disseminated as a cancer prevention strategy by improving child public health nutrition.

**Translational Aspect:** The project can be categorized as T3 research as it directly addresses the implementation of evidence-based dietary guidelines in the childcare setting.

**P32 | Theory-Informed Assessment of Barriers and Enablers to Implementation of Dietary Guidelines in Childcare Centers**

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**Background:** Implementation of dietary guidelines in childcare centers is recommended as a cost-effective strategy to prevent the development of cancer-related risk factors and chronic disease. However, poor compliance with dietary guidelines is common. Few studies have assessed barriers or enablers to guideline implementation in this setting; however, none have utilized a theory-based implementation framework, such as the Theoretical Domains Framework (TDF).

**Aims:** To apply the TDF to identify (i) perceived barriers and enablers to implementation of dietary guidelines reported by childcare center cooks; and (ii) barriers and enablers associated with greater implementation based on assessment of center menu compliance.

**Methods:** A cross-sectional telephone interview was undertaken with randomly selected childcare centers in NSW. Childcare center cooks completed a 61-item adapted measure assessing 14 TDF constructs, on a seven-point Likert scale ranging "strongly disagree" to "strongly agree." Higher (≥6) mean scores are indicative of potential enablers, with lower (<6) mean scores suggestive of potential barriers to dietary guideline implementation. Centers were asked to provide a copy of their menu for review of menu compliance.

**Results:** Two-hundred and two (59%) childcare cooks completed the questionnaire and 70 (35%) provided their menu. Scores were lowest for "reinforcement" (mean: 5.85) and "goals" (mean: 5.89) domains, and highest for "beliefs about consequences" (mean: 6.51) and "social/professional role and identity" (mean: 6.50). "Skills" was positively associated with greater implementation of guidelines based on menu review (P < 0.01).

**Conclusions:** "Reinforcement" and "goals" domains may be perceived barriers to dietary guideline implementation. Cooks perceived "social/professional role and identity" and "beliefs about consequences" to be enablers, however, only "skills" was associated with greater implementation. Opportunities exist to target the incongruence in perceptions versus reality of barriers and enablers to improve the implementation of dietary guidelines as a strategy for preventing the development of health risk factors associated with cancer and other chronic disease.

**Translational Aspect:** The project can be categorized as T3 research as it directly identifies the barriers and enablers to the implementation of evidence-based dietary guidelines.
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