



THE UNIVERSITY OF
SYDNEY

Honours Projects

2024

Sydney Pharmacy School, Faculty of Medicine and Health



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Prof Bandana **Saini**

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Dr Mouna **Sawan**

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Professor Johannes (Jan-Willem) Alffenaar

Professor Jan-Willem Alffenaar is a hospital pharmacist and clinical pharmacologist. The research of his group focuses on personalized dosing of drugs to optimize efficacy and reduce toxicity using therapeutic drug monitoring.



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- **Academic Profile:** [Professor Jan-Willem Alffenaar \(sydney.edu.au\)](https://www.sydney.edu.au/~alfenaar/)
- **Research Group:** 2 postdocs and 5 PhD students

Project 1: Saliva for therapeutic drug monitoring for anti-infectives

Co-Supervisor: Dr Hannah Yejin Kim

Project Summary: Cancer patients undergoing complex anti-cancer treatments, often in an immunosuppressed state, are susceptible to invasive fungal infections (IFIs) for which drugs like voriconazole are crucial. However, maintaining optimal drug levels is challenging, as sub-therapeutic can lead to treatment failure and supra-therapeutic concentrations cause toxicity. Traditional therapeutic drug monitoring (TDM) methods involves invasive blood sampling, offsite laboratory testing, and lengthy result turnaround times. Voriconazole offers an opportunity for innovation by developing a point-of-care saliva assay for TDM [Kim et al. Front Pharmacol. 2020;11:894].

The aim of the project is to:

- a) Perform a systematic literature review to evaluate use of saliva for TDM of anti-infective drugs.
- b) Develop a saliva assay of voriconazole on a portable UV spectrophotometer (Nanophotometer NP80).

Techniques/Methods: systematic literature review, assay development according to ICH-10 guideline, and manuscript writing.

Project 2: Saliva for therapeutic drug monitoring for anti-cancer drugs

Co-Supervisor: Dr Hannah Yejin Kim

Project Summary: Cancer patients receiving complex anti-cancer treatments, require personalised dose to minimize toxicity and optimize efficacy. Achieving an optimal drug level is challenging, as traditional therapeutic drug monitoring (TDM) methods involves invasive blood sampling, offsite laboratory testing, and lengthy result turnaround times. Saliva could allow a non-invasive, point-of-care TDM. Studies have reported a substantial saliva penetration for various anticancer drugs and correlation between saliva and plasma concentrations. An opportunity for innovation is development of a point-of-care saliva assay for TDM. See for example Alffenaar et al. JAC. 2021;76(2):423-429.

The aim of the project is to:

- a) Perform a systematic literature review to evaluate use of saliva for TDM of anti-cancer drugs.
- b) Develop a saliva assay for anticancer drug on portable UV spectrophotometer (Nanophotometer NP80).

Techniques/Methods: systematic literature review, assay development according to ICH-10 guideline, and manuscript writing.

Professor Thomas Balle

I am passionate about ion-channel drug discovery and computational drug discovery methods. My research aims to characterise new drug targets and identify new lead molecules and drugs that can help treat patients suffering from mental health disorders.

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- **Research Group:** 3 PhD/Mphil students

Project:

Co-Supervisors: A/Prof Stephen Fuller, Nepean Clinical School; Dr Jake Chen, Sydney Pharmacy School

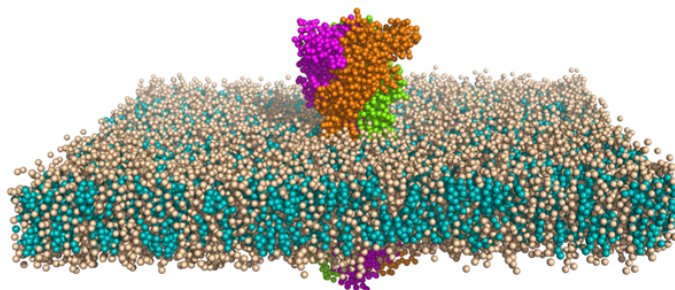


Figure: P2X7 receptor within an epithelial cell membrane

P2X7 receptors are ion channels involved in the host immune response to infection. In this project we aim to use molecular modelling to identify novel positive and negative allosteric modulators to combat inflammation. Positive modulators enhance activity and may result in the release of anti-inflammatory molecules like IL-10. This can be advantageous in conditions where boosting the immune response and reducing inflammation is desirable, such as infectious diseases or cancer immunotherapy. Negative modulators on the other hand reduce the activity of P2X7 receptors and lead to decrease in the release of pro-inflammatory cytokines. This downregulation can be beneficial in conditions characterized by excessive inflammation, such as autoimmune diseases and chronic inflammatory disorders.

In this project we will use molecular modelling to characterise binding of known modulators and subsequently use high throughput virtual screening to identify new molecules.

Techniques/Methods: Molecular modelling software for ligand and structure based virtual screening. High performance computing, 3D-visualisation, scripting/basic programming, molecular dynamic (MD) simulations.

Literature: Bidula et al: <https://doi.org/10.1038/s41419-019-2110-3>

Associate Professor Ronald Castelino

Research Passion: Ronald Castelino is a A/Prof at the University of Sydney, Faculty of Medicine and Health, School of Pharmacy. He is a practising renal pharmacist (Blacktown Hospital) with a track record in translational research relevant to renal medicine.

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- **Research Group:** 3 PhD students, 2 MPhil students, 1 Honours student, 4 post-doctoral researchers.



Project: Treatment burden in people with kidney failure: Understanding patient priorities and coping mechanisms

Co-Supervisors: Wubshet Tesfaye, Connie Van

Project Summary: Kidney failure imposes substantial medical, social, and financial burden on individuals, families, and communities. The immense disease, treatment and psychosocial burden and adaptive demand people with kidney failure experience is frequently under-recognised and unappreciated, and therefore not adequately responded to by health care professionals. People undergoing dialysis are particularly prone to significant treatment burden due to the parallel need for medication and regular dialysis regimes. Understanding patient priorities and coping mechanisms in handling overall treatment burden is crucial for proposing and co-designing a tailored intervention that can lead to improved patient-reported outcomes (PROMs). The major aim of this project is to perform a review of recent evidence (i) to understand patient perceptions and priorities regarding their treatment in people receiving haemodialysis and (ii) examine the association between actual or perceived medication burden and PROMs, such as HRQoL, symptom burden and medication adherence.

Techniques/Methods: The first phase constitutes a systematic review of published studies that examined medication burden (both real as well perceived) and its link with PROMs and other relevant health outcomes such as hospitalisation and disease progression. Studies, to be included, need to have assessed medication burden using objective assessments like Drug Burden Index, Anticholinergic Cognitive Burden, and polypharmacy and/or self-reported methods like completion of Living with Medicines Questionnaire (LMQ) or Treatment Burden Questionnaire (TBQ). The second phase involves an exploratory mixed-methods (a baseline survey with a semi-structured interview) study targeting patients undergoing haemodialysis at Blacktown Hospital renal service, NSW. patients will be approached via the pharmacy department at Blacktown Hospital and may include patients undergoing both in-centre or home haemodialysis. The increased prevalence of medication use has led to higher rates of polypharmacy and hyperpolypharmacy as well as perceived treatment burden. This study is expected to provide an in-depth understanding of the perceived treatment burden (actual or perceived) and coping mechanisms employed by patients, potentially informing interventional studies aimed at improving health outcomes in this vulnerable population.

Dr Stephen Carter

Stephen is a registered pharmacist with clinical specialisation in medication management review. Stephen aims to understand more about: a) how consumers and their caregivers obtain and use their medicines and medicines information; and b) how best to design and utilise pharmacist services. Stephen is currently focussed on co-leading the #STOP study.¹



This is an Australian Government Medical Research Future Fund (MRFF) Randomised Controlled Trial (RCT) conducted in 8 sites throughout NSW and Victoria. The intervention is designed to reduce re-fracture risk through pharmacist-led medication review to deprescribe sedative and anticholinergic medicines and improve adherence to bone resorption therapies.

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Project 1: Consumers' views of pharmacist-led medication reviews for patients with Osteoporosis in a large-scale randomized controlled trial (RCT)¹

Co-Supervisor: Prof Rebekah Moles

Project Summary: The honours student will receive research training and experience in qualitative methods to understand more about patients views of pharmacists' recommendations to deprescribe sedative and anticholinergic medicines.

Techniques/Methods: Systematic Review, Clinical Trials, Thematic analysis.

Project 2: Quantifying the impact of a pharmacist-led medication management reviews for patients with Osteoporosis – a large-scale randomized controlled trial (RCT)¹

Co-Supervisor: Prof Rebekah Moles

Project Summary: The honours student will receive research training and experience in descriptive statistics and quantitative methods. The aim is to categorise and quantify pharmacists deprescribing recommendations for sedative and anticholinergic medicines and how these recommendations are enacted upon.

Techniques/Methods: Systematic Review, Clinical Trials, Statistics.

Selected Publication: ¹Moles RJ, Perry L, ... Carter SR. Safer medicines To reduce falls and refractures for Osteoporosis (#STOP): a study protocol for a randomised controlled trial of medical specialist-initiated pharmacist-led medication management reviews in primary care. *BMJ Open*. 2023;13(8):e072050.

Professor Tim Chen

Research Passion – All things medication review and research methods



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- **Research Group:** Head of Pharmacy Practice and Health Services Research

Project:

Co-Supervisor: Prof Bek Moles, Dr Margaret Jordan

Project Summary: A critical need for the pharmacy profession in Australia (and globally) is to have strong evidence for the value of expanded scope of practice services such as Home Medicines Review. This project aims to develop and validate a classification system for the recommendations and outcomes made by pharmacists during the medication management review process. Our research team has extensive research and clinical practice experience and is currently leading large-scale (\$multi-million) Government funded multidisciplinary trials (eg Aspiretrial.com.au, #Stop study) involving Home Medicines Review. We also have an extensive network of national and international collaborators who will be invited to join this study. HMR case studies will be used to develop and evaluate a taxonomy for the recommendations and outcomes of HMR. An expert panel will be used to validate findings. This research will build on our existing research in developing and validating taxonomies for the causes of drug related problems and medication discrepancies. The expected outcome is a validated taxonomy for recommendations and outcomes for medication management reviews. The classification system developed has the potential to be used as an evaluation measure for pharmacy services both in Australia and internationally and build on the PCNE classification system (https://www.pcne.org/upload/files/417_PCNE_classification_V9-1_final.pdf).

Techniques/Methods:

1. Basger, B.J., R.J. Moles, and T.F. Chen, *Development of an aggregated system for classifying causes of drug-related problems*. *Annals of Pharmacotherapy*, 2015. **49**(4): p. 405-18.
2. Almasreh, E., R. Moles, and T.F. Chen, *The medication discrepancy taxonomy (MedTax): The development and validation of a classification system for medication discrepancies identified through medication reconciliation*. *Research in Social and Administrative Pharmacy*, 2020. **16**(2): p. 142-148.
3. Almasreh, E., R. Moles, and T.F. Chen, *Evaluation of methods used for estimating content validity*. *Research in Social and Administrative Pharmacy*, 2018.
4. Gisev, N., J.S. Bell, and T.F. Chen, *Interrater agreement and interrater reliability: key concepts, approaches, and applications*. *Research In Social & Administrative Pharmacy*, 2013. **9**(3): p. 330-8.

Dr Orin Chisholm

My research focuses on pharmaceutical policy, regulations and increasing professional standards in the sector.



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- **Research Group:** 1 DrPH student (UNSW), various collaborators in pharmaceutical industry

Project: What are the barriers and enablers for service provision by community pharmacists in the clinical trial enterprise?

Co-Supervisor: Dr Philip Kwok, senior lecturer, School of Pharmacy, [Dr Philip Kwok \(sydney.edu.au\)](https://www.sydney.edu.au/people/academic-profiles/2022/01/01/dr-philip-kwok)

Industry co-supervisor: Dr Janelle Bowden, Managing Director, AccessCR, <https://www.linkedin.com/in/janellebowden/>

Project Summary: Community pharmacists are increasingly recognised as essential healthcare providers and play a vital role in the healthcare system. Recently their scope of practice has expanded beyond dispensing and ensuring the quality use of medicines to providing greater counselling services, immunisations and limited prescribing of medicines. At the same time, we have seen a move towards more decentralised clinical trials, especially as a way to improve equity of access to clinical trials. Community pharmacists may be able to contribute to the decentralised clinical trial ecosystem. We are interested in understanding the barriers and enablers for service provision by community pharmacists in the clinical trial ecosystem. This project will involve a literature review and survey of community pharmacists to try to understand and support the potential role of community pharmacists in increasing equity of access to clinical trials.

Techniques/Methods: Techniques include literature review, survey development and deployment, Ethics application, survey analysis and manuscript writing and presentation.

Selected Recent Publications of Supervisors:

1. McKenzie A, **Bowden J**, Zalcborg JR, et al. A snapshot of consumer engagement in clinical trials in Australia: results of a national survey of clinical trial networks and research organisations. *Res Involv Engagem*. 2022;8(1):3. Published 2022 Feb 5. doi:10.1186/s40900-022-00338-w
2. Yoffe A, Liu J, Smith G, **Chisholm O**. A Survey of Industry Perceptions of Facilitated Regulatory Pathways in Drug Development in Australia. *Pharmaceut Med*. 2023;37(5):385-394. doi:10.1007/s40290-023-00483-x
3. Chan HW, Chow S, Zhang X, **Kwok PCL**, Chow SF. Role of Particle Size in Translational Research of Nanomedicines for Successful Drug Delivery: Discrepancies and Inadequacies. *J Pharm Sci*. 2023;112(9):2371-2384. doi:10.1016/j.xphs.2023.07.002

References:

1. Lal L, Ryan K, Liu IY, Price B, Lockwood T, Aguirre I, Slobodian P, Lam A, Vassan M, Lim K, Silverii J, Tesoriero J, Phu J, Lim W, Naidoo B, Russell N, Rundle M, Sewell R, Cooper C, Hardman A, Quinn M, Mak A and Wright EJ (2019) Transformation of Australian Community Pharmacies Into Good Clinical Practice Compliant Trial Pharmacies for HIV Pre-Exposure Prophylaxis. *Front. Pharmacol*. 10:1269. doi: 10.3389/fphar.2019.01269
2. Crilly P, Patel N, Ogunrinde A, Berko D, Kayyali R. Community Pharmacists' Involvement in Research in the United Kingdom. *Pharmacy*. 2017; 5(3):48. <https://doi.org/10.3390/pharmacy5030048>

Associate Professor Ingrid Gelissen

I am passionate about the role of nutrition in the development and management of chronic disease. My experience in this area ranges from basic scientific approaches through to applied research as well as nutrition education over the course of my career.

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Project: Nutrition counselling in Pharmacy Practice

Co-Supervisors: Dr Joanna Harnett (School of Pharmacy), Prof Ines Krass (School of Pharmacy) and Prof Margaret Allman-Farinelli (Sydney Nursing School)

Project Summary:

Community pharmacists are one of the most accessible health care professionals within and outside of major population centres. One of the learning domains in pharmacist's training is to recommend non-pharmacological interventions for patients to assist in the management of their medical conditions. Nutrition is one of the pillars of non-pharmacological interventions and contributes, often in combination with prescription medications, to the overall treatment strategy of non-communicable diseases such as diabetes, cardiovascular disease, hypertension and



gastrointestinal conditions. We have recently completed two studies, investigating attitudes and confidence of pharmacists in providing nutritional counselling to their patients [1 and unpublished]. In line with overseas studies [2,3], we found that pharmacists express positive attitudes towards nutrition counselling, however they lack confidence as well as adequate training to effectively

counsel their patients. In addition, they expressed an interest in better resources to use during nutrition counselling and to provide to their patients. The aim of our study is to develop and test prototype resources, focussed on selected disease areas, that can assist pharmacists during nutrition counselling and that can be shared with patients.

Techniques/Methods: Mixed-method qualitative research methods.

Selected Publications:

[1] Carter, Krass, Harnett and Gelissen. 2022 *Curr Pharm Teach Learn* 14; 1411–1419.

[2] Douglas *et al.* 2019 *Pharmacy* 7: 27; doi:10.3390/pharmacy7010027

[3] Medhat *et al.* 2019 *Int J Clin Pharm*; doi.org/10.1007/s11096-020-01106-0

Picture from: www.heartfoundation.org.au

Associate Professor Danijela Gnjidic

Our research is primarily focused optimising the quality use of medicines in older adults. We conduct studies in clinical and geriatric pharmacology, clinical studies on polypharmacy and deprescribing, in older adults with dementia and their carers.



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- **Research Group:** Multi-disciplinary research group of Research Fellow, 5 PhD students, 2 MPhil students.

Project: Pilot deprescribing cohort study to inform patterns of medication discontinuation in primary care

Co-Supervisor: A/Prof Carl Schneider

Project summary: Globally, healthcare systems are challenged with providing appropriate care to patients with complex care needs, multiple chronic conditions and multiple medications. Deprescribing or medication cessation is often necessary to mitigate consequences of polypharmacy in vulnerable patient groups such as older adults with multimorbidity. However, in the real world setting, it is often challenging to identify which patients are more likely to have their medications deprescribed safely, especially over the longer-term. To address this gap, the aims of this study are to:

1. Assess the feasibility of measuring deprescribing patterns in primary care;
2. Identify patient characteristics (e.g. social) that will predict the trajectory of deprescribing patterns in primary care.

Techniques/Methods: The research skills will include participant recruitment, data management and data analysis. The student will work with collaborators at the University of Sydney and nationally.

Professor Paul Groundwater

Paul's research interests include the design and synthesis of novel agents for the treatment of cancer and bacterial infections; the identification of the active principle of medicinal plants; and new methods for the detection of bacteria.



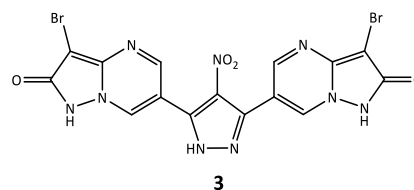
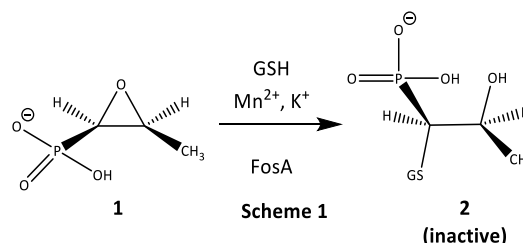
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Project: Development of novel small molecule adjuvants designed to potentiate antibacterial activity against multi-drug resistant Gram negative pathogens

Co-Supervisors: Prof Dai Hibbs, Dr Jonathan Du

Project Summary: Multidrug resistant (MDR) bacteria account for 15% of global hospital acquired infections, one of the leading causes of nosocomial mortality, and the six ESKAPE pathogens account for the majority of these infections. (Mulani et al., 2019) Carbapenemase producing ESKAPE MDR pathogens are on the WHO critical priority list. Developing novel antibacterial agents is not the sole solution to this urgent problem, as targeting the mechanisms that lead to resistance is a new approach to overcoming MDR. Combinations of antibacterials (the carbapenem β -lactams, e.g. meropenem) and agents which inhibit their degradation (β -lactamase inhibitors, e.g. vaborbactam) and thus overcome resistance, represent 40% of agents currently in clinical development.

For example, the antibiotic fosfomycin (FOM) **1**, which was approved by the FDA for the treatment of urinary tract infections in 1996, has a broad spectrum of activity against both Gram positive and negative pathogens, good bioavailability, and very low toxicity. One of the main mechanisms for FOM resistance in Gram negative organisms such as the ESKAPE bacteria, *P. aeruginosa*, *K. pneumoniae* and *Enterobacter spp.*, is enzymatic drug inactivation by FosA, **Scheme 1**. (Falagas et al., 2016) Our collaborators have shown that a novel competitive inhibitor of FosA, ANY1 **3**, potentiates the antibacterial activity of FOM in representative Gram negative pathogens. (Tomich et al., 2019)



Techniques/Methods: This project will utilize molecular modelling to identify agents which inhibit the enzymes responsible for the degradation of key antibacterial classes. (El-Khoury et al., 2022) The inhibitors identified by the modelling will then be evaluated as adjuvants for the specific antibacterial class, through the determination of their effect on the minimum inhibitory concentration (MIC) of the drug against MDR bacteria upon treatment with adjuvant-drug combinations.

References: El-Khoury et al., *RSC Med Chem*, 2022, in press (<https://doi.org/10.1039/D2MD00263A>); Falagas et al., 2016, *Clin Microbiol Rev*, **29**, 321-47; Mulani et al., 2019, *Front Microbiol*, **10**, 539-539; Tomich et al., 2019, *Antimicrob Agents Chemother*, **63**, 14.

Dr Joanna Harnett

My research explores the appropriate and safe use of complementary medicines (CM), and the role of the gut and oral microbiome in health and disease. Studies evaluate CM product use in a range of populations, and product efficacy, quality, and safety. This includes the effect of nutrition, prebiotic and probiotic interventions on the composition and function of microbial communities. I am passionate about conducting research that can inform and resource health care professionals towards best practice.



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- **Research Group:** I work with a team of Australian and international natural medicines researchers. In 2023 - 3 PhD students (as principal supervisor) and 1 MPhil students (as principal supervisor); 1 Honours student.

Project: Quality of valerian products in Australia

Co-Supervisors: **Professor Jane Hanrahan** <https://www.sydney.edu.au/medicine-health/about/our-people/academic-staff/jane-hanrahan.html> , **Dr Jocelin Chan**

Project Summary: Approximately 13 – 33% adult Australians report having a sleep disorder [1]. Poor or inadequate sleep disorder increase the risk of other conditions including depression and cardiovascular risk factors [1]. Use of natural medicines including herbs to aid sleep are common practice - a cross-sectional survey conducted in Victoria Australia reported 4.3% of the population (n = 2526) had used the herbal product valerian in the past 12 months for the management of a sleep disorder (77.2%) [2]. Valerian products are predominantly accessed through pharmacy for the management of insomnia and regulated as a complementary medicine (CM) in Australia. The Therapeutic Goods Administration (TGA) is responsible for regulating complementary medicines marketed in Australia including valerian products. High variations in some commercially available herbal products have been reported [3]. The quality of valerian products available to the Australian population has not been reported. Therefore, this study aims to evaluate the quality of widely available valerian products. The results of this study will inform stakeholders such as pharmacists, the TGA, CM manufacturers and healthcare professionals regarding the quality of valerian products currently used for the management of sleep disorders in Australia.

Techniques/Methods: This project involves using thin layer chromatography and high-performance liquid chromatography to evaluate and quantify the bioactive constituent valerianic acid in valerian products.

References:

1. Cunnington D, Junge MF, Fernando AT. Insomnia: prevalence, consequences and effective treatment. *Med J Aust* 2013; 199:S36-S40.
2. Zhang AL, Story DF, Lin V, Vitetta L, Xue CC. A population survey on the use of 24 common medicinal herbs in Australia. *Pharmacoepidemiol Drug Saf* 2008; 17:1006-13.
3. Chan WJJ, McLachlan AJ, Wheate NJ, Harnett JE. An evaluation of garlic products available in Australian pharmacies – From the label to the laboratory. *J Herb Med* 2018; 14:61-67.

Associate Professor Tina Hinton

My primary research area is neuropharmacology. More recently, my research also focuses on complex learning environments and the influences of physical and virtual design, instructional design and social design on learner experience and learner participation in valued practices. I also supervise research projects relating to the impact of online education on student and staff motivation and engagement, as well as technology-enhanced learning strategies that promote student engagement.



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- **Research Group:** Charles Perkins Centre Biomedical Education Research Group

Co-supervisor: Dr Jessica Pace

I am a health policy and health services researcher with current hospital pharmacy practice experience. My research interests are in using empirical bioethics (combining qualitative methods with theoretical ethical analysis) to find practical solutions to morally complex problems relating to medicines access and regulation, as well as pharmacy education, learning, and assessment.



Project: Exploring pharmacy students' experiences of technology-enhanced learning

Project Summary: Technology-enhanced learning is now an established practice in pharmacy education and occurs in multiple ways, for example, learning management systems, communication tools, cloud-based learning platforms, bespoke simulations, and ePortfolios. Development of complex skills requires complex learning environments which some may argue are only accessible through in-person activities in combination with technologies. Despite extensive use, it is still critical to understand how effectively technology-enhanced learning is implemented and experienced in undergraduate and postgraduate pharmacy curricula. Two learning theories that underpin our understanding of student learning are constructivism and connectivism. Constructivism suggests that students construct knowledge and skills through their experiences and participation in valued practices. Connectivism emphasises the importance of technologies and networks in the learning and creation of knowledge. This project aims to explore the utility of technologies in enhancing pharmacy student learning of complex skills such as clinical review, dispensing, and patient counselling. Interview and questionnaire methods will be used to ascertain student and staff experiences of technology-enhanced learning for complex skills development, based on connectivist and constructivist learning frameworks. Outcomes from this research will help identify optimal technologies as well as optimal technology-enhanced curriculum practices.

Techniques/Methods: Interview and questionnaire (survey) methods, including questionnaire item and interview design and implementation, qualitative analysis methods, descriptive and inferential statistical analyses and survey reliability and factor analyses.

Selected Publication: Chen, M., Salama, R. and Hinton, T. (2022). How do technology enhanced learning strategies affect healthcare students' engagement? A mixed methods study. *ASCILITE 2022 Conference Companion Materials*.
<https://doi.org/10.14742/apubs.2022.206>

Dr Stephen Hughes

Research Passion: Research into experiences of practitioners and consumers of Healthcare

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- **Research Group:** Pharmacy Practice (Sydney Pharmacy School)



Project: The experience of sleep in people with severe asthma

Co-Supervisor: Prof Bandana Saini

Project Summary: Severe asthma is '*asthma that remains uncontrolled despite treatable factors having been addressed and maximal inhaled therapy being taken regularly*'. About 3-10% of the 10% of Australians with asthma are classified as having severe asthma. Research on sleep and breathing disorders focussed on issues such as obstructive sleep apnea (OSA) and insomnia. OSA is often comorbid with chronic obstructive pulmonary disease and asthma (i.e. overlap syndrome). Insomnia, defined as having difficulty initiating/maintaining sleep, not having sufficient sleep duration or non-restorative sleep, may occur as a consequence of repeated nocturnal asthma symptoms. Research to date has focused on the prevalence of sleep disorders in severe asthma but the lived experience of sleep in people with severe asthma is under-explored. Given that severe asthma and sleep disorders have psychosocial elements that are important to the individual and have a significant effect on their wellbeing, it is important to understand how those with severe asthma manage their sleep health, which is what this project will aim to do.

Techniques/Methods: The aim of this project will be to conduct qualitative semi-structured interviews with consenting people who meet the criteria for severe asthma (participants). Recruitment of people with severe asthma (n=10-12) will be through contacts of the researchers and through community pharmacies. The participants will then keep a sleep diary for 1 week and a follow up semi-structured interview will be conducted. Data from the interviews will be transcribed verbatim and analysed inductively for emergent themes.

Dr Andrzej S. Januszewski MD, PhD, MClintRes Senior Research Fellow

Dr. Andrzej Januszewski is an esteemed expert in the study of the mechanisms contributing to the development and progression of vascular complications related to diabetes. At the helm of the Biomarkers Laboratory in the Medical Foundation Building (K25), he supervises a dynamic team dedicated to carrying out intricate assays for multiple clinical trials. Throughout his career, Dr. Januszewski has consistently contributed to the academic community with his wide-ranging publications, primarily focusing on the associations of different biomarkers with the pathophysiology of diabetes. Beyond his research, he is a forerunner in digital innovation, having spearheaded the development and deployment of multiple online tools for clinicians. These platforms not only optimize patient care but also offer a means for healthcare professionals to engage in informed dialogues with patients, discussing therapeutic choices and furthering research in diabetes.



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- **Research Group:** Biomarkers Laboratory

Project: Associations between Socio-Economic Status and Education and Medications Usage Profile

Co-Supervisor: Prof. Anthony C. Keech MD MBBS, MSc (epidemiology), FRACP, FCSANZ, FAAHMS

Project Summary: In most research projects, the socio-economic status of study participants is determined from their postcodes. In Australia, the Australian Bureau of Statistics (ABS) ranks areas based on their relative socio-economic advantage and disadvantage using data from the Census, referred to as the Socio-Economic Indexes for Areas (SEIFA). The Index of Relative Socio-economic Advantage and Disadvantage (IRSAD) provides a comprehensive summary about the economic and social conditions of people and households within a given area. Statistical Areas 1 (SA1) generally encompass a population of 200 to 800 individuals, with an average count of about 400 people. SA1s are designed to be the smallest unit for releasing census data. To illustrate, in NSW, there are 624 postcodes with an average population per postcode of 13,355. In contrast, there are 18,931 SA1 units in NSW, each with an average population of 424 people, and each equipped with SES indexes. This provides a significantly higher granularity in data representation. This project will tap into data from a clinical trial conducted by the NHMRC Clinical Trials Centre. The primary objective is to discern associations between socio-economic status (SES), education, and the utilisation patterns of various drug classes (e.g. lipid-lowering, anti-hypertensive, NSAID, dietary supplements) stratified by multiple categorical factors and looking for associations between these variables. The innovative approach this project introduces is the utilisation of ABS SA1 codes in lieu of postcodes to characterize socio-economic status. While we will provide comprehensive training for the student to execute this project, we expect a degree of autonomy, especially in IT and statistical tasks. The student will be mandated to sign a confidentiality agreement, and all analyses will be conducted on a secure, locked-down computer.

Techniques/Methods: Statistical analysis: R, medications coding, propensity score matching, correspondence analysis. IT techniques: Python application, working with APIs, geocoding services.

Dr Lifeng Kang

Dr Kang's research is in the field of the microscale technologies and 3D printing in drug delivery and tissue engineering. For drug delivery, microstructures can be engineered to deliver drugs (e.g., microneedles). For tissue engineering, they can be used to fabricate biomimetic scaffolds to regenerate tissues and organs.



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- **Academic Profile:** kanglab.net
- **Research Group:** Currently 2 PhD students

Project: The personalised polypill: 3D printing to simplify medication taking in older people

Co-Supervisor: Dr Edwin Tan (Sydney Pharmacy School)

Project Summary: Over 40% of people aged 65 years and older use five or more medications. Clinically appropriate polypharmacy, although necessary to manage multimorbidity, may contribute to low adherence, pill burden, inaccurate dosing, and medication errors. This is particularly problematic in vulnerable patient groups such as those with cognitive impairment and dementia. 3D printing can be used to combine complex medication regimens into a single personalized pill. This can allow for tailoring of drug combinations, doses, and release profiles to suit patient needs, thus improving patient adherence, tolerability and health outcomes. We propose to investigate the feasibility of a personalized polypill using 3D printing technology. Upon completion of this project, we will have a prototype 3D Rx printer to be used in pharmacies to make personalised polypills.

Techniques/Methods: To use a 3D printer to fabricate tablets to deliver multiple drugs and characterize the tablets in a wet lab in Sydney Pharmacy School.

Selected Publications:

Englezos K, Wang L, Tan E, Kang L. 2023. 3D printing for personalised medicines: implications for policy and practice. *International Journal of Pharmaceutics*. 635 (2023) 122785.

10.1016/j.ijpharm.2023.122785. Anwar-Fadzil AF, Yuan Y, Wang L, Kochhar JS, Kachouie, NN, Kang L. 2022. Recent Progress in 3D Printed Dosage Forms from Pharmacist Perspective. *Journal of Pharmacy and Pharmacology*. DOI: 10.1093/jpp/rgab168.

Lim SH, Kathuria H, Muhd Hafiz bin Amir, Zhang X, Duong HTT, Ho CLP, Kang L. Jan 2021. High resolution photopolymer for 3D printing of personalised microneedle for transdermal delivery of anti-wrinkle small peptide. *Journal of Controlled Release*. 329, 907-918. DOI. 10.1016/j.jconrel.2020.10.021

Chen G, Xu Y, Kwok PCL Kang L. 2020. Pharmaceutical applications of 3D printing. *Additive Manufacturing*. 34:101209. DOI: 10.1016/j.addma.2020.101209.

Lim SH, Chia SMY, Kang L, Yap KYL. 2016. Three-dimensional-printing of carbamazepine sustained-release scaffold. *Journal of Pharmaceutical Sciences*. 105(7):2155-63. 10.1016/j.xphs.2016.04.031.

Associate Professor Veysel Kayser

Our lab aims to develop new biotherapeutics, especially monoclonal antibodies (mAbs), vaccines, and novel mAb/vaccine formulations. Biotherapeutics are the top-selling drugs and fastest growing class of pharmaceuticals. Understanding their degradation pathway will enable us engineer next-generation biotherapeutics. So, our efforts involve understanding protein aggregation, which is the most common degradation pathway of biotherapeutics.



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- **Research Group:** We have 4 PhD and 1 Honours students

Project 1: Novel Formulation Approaches for Biotherapeutics and Vaccines

Co-Supervisor: A/Prof. Serdar Kuyucak (Physics)

Project Summary: Previously, we developed new formulation strategies for mAbs and vaccines (1, 2). In this project, we will prepare novel mAb and vaccine formulations using ionic liquids and other additives, and conduct accelerated studies at elevated temperatures. Various biophysical methods such as fluorescence, UV-Vis, and light-scattering spectroscopy, and HPLC will be employed. Mainly, external dye-binding method using a hydrophobic dye will be utilised to probe molecular interactions (3). The student will have an opportunity to participate in an ongoing collaboration with a large pharma.

Techniques/Methods: The student will mainly use UV-Vis and fluorescence spectroscopy methods, but s/he will have an opportunity to work closely with other group members and learn about other methods.

Project 2: Elucidating Protein Aggregation

Co-Supervisor: A/Prof. Serdar Kuyucak (Physics)

Project Summary: Therapeutic proteins such as mAbs and vaccines degrade over time mainly due to protein aggregation, making their development, manufacturing and long-term storage difficult. Previously, we developed a protein aggregation model and various predictive methods for candidate and formulation screening, and long-term stability estimation of mAbs and influenza vaccines (3-5). The focus of the project will be detecting protein aggregates and study protein-protein aggregation using in-house developed methods. External dye-binding method using a hydrophobic dye will be utilised to probe molecular interactions (3,5). The student will have an opportunity to participate in an ongoing collaboration with a large pharma.

Techniques/Methods: The student will mainly use UV-Vis and fluorescence spectroscopy methods, but s/he will have an opportunity to work closely with other group members and learn about other methods.

Selected Publications: **(1)** Z. Elgundi *et al.* (2017). *Adv Drug Deliv Rev*, 122, 2-19. **(2)** M. Reslan *et al.* (2018). *Chem Comm*, 54(75), 10622-10625. **(3)** Z. Sahin *et al.* (2017). *Vaccine*, 35(23), 3026. **(4)** V. Kayser *et al.* (2011). *J Pharm Sci*, 100(7), 2526-2542. **(5)** V. Kayser *et al.* (2012). *Biotech J*, 7(1), 127-132.

Dr Philip Chi Lip Kwok

My research interests include:

- Respiratory drug delivery
- Particle engineering
- Physicochemical characterisation of powders
- Electrostatics of aerosols for inhalation
- **Contact:** philip.kwok@sydney.edu.au
- **Location:** Camperdown campus
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- **Research Group:** 4 PhD students



Project: Inhalable powders for enhancing the delivery of cannabinoids

Co-Supervisors: Prof Hak-Kim Chan, Prof Jonathon Arnold

Project Summary: Cannabinoids have a variety of pharmacological actions but they have low aqueous solubility and low oral bioavailability, which pose challenges to their delivery. Inhalation is an alternative route of administration with higher bioavailability for these compounds. This project aims to develop and characterise inhalable cannabinoid formulations with enhanced solubility. It involves particle production, dissolution tests, and aerosol performance evaluation. Powders with good physicochemical and aerosolisation properties may potentially be tested *in vivo* in the future.

Techniques/Methods: Spray drying/spray freeze drying, high performance liquid chromatography, and cascade impaction

Selected Publications:

1. Tai W, Anderson LL, Arnold JC, Chan H-K, Kwok PCL (2021) Inhalable cannabidiol dry powders with enhanced solubility. *Drug Delivery to the Lungs 2021 Conference Papers*. (Available upon request)
2. Devinsky O, Kraft K, Rusch L, Fein M, Leone-Bay A (2021) Improved bioavailability with dry powder cannabidiol inhalation: A Phase 1 clinical study. *Journal of Pharmaceutical Sciences* 110(12): 3946-3952. (<https://doi.org/10.1016/j.xphs.2021.08.012>)

Professor Christine Lu

My research interests are in health policy, precision medicine, pharmacoepidemiology, and quality use of medicines.

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Project: Precision medicine in older adults

Co-Supervisors: Dr Edwin Tan, Dr Sarah Hilmer, Dr Kenji Fujita

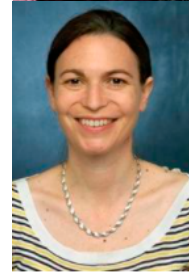
Project Summary: Precision medicine offers one approach to fine tune a range of treatments and/or prevention strategies to each individual to support disease diagnosis and screening, predict disease risk, predict drug toxicity, and inform patient drug responsiveness. Precision medicine tests are increasingly used in clinical care and covered under Medicare. Precision medicine is especially relevant in older patients, where comorbidities and many individual variabilities such as age, environment, and genomics are the norm. This study will investigate the prevalence and utilization patterns of pharmacogenetic testing and related medicines by older Australians across the community, and the patient sociodemographic and other factors associated with testing. This study will involve analysis of linked data from national administrative datasets and national health surveys. Findings will inform future research, and guide policy and practice around the use of precision medicine tests and medication prescribing in Australia.

Techniques/Methods: This project would be suited to students with a keen interest in big data science, precision medicine, epidemiology, and geriatric pharmacy.

Dr Nashwa Masnoon and Professor Sarah Hilmer

Our research team works on improving the safety and effectiveness of medicines for older adults. We use laboratory, clinical and population-based studies to understand the risks and benefits of medicines in older people with multiple chronic medical conditions. These findings help minimise medication-related harm and optimise care in older adults.

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- **Research Group:** Postdoctoral research fellows, PhD and Honours students, multidisciplinary clinicians including pharmacists and research manager



Project: Exploring reasons behind sustainability of in-hospital deprescribing from the perspectives of different medication management stakeholders: a case series analysis

Co-Supervisors: Professor Sarah Hilmer, Dr Lisa Kouladjian O'Donnell, Ms Sarita Lo, Dr Edwin Tan

Project Summary: Medication review in hospital identifies opportunities for deprescribing to reduce medication-related harm. Deprescribing is the planned and supervised withdrawal of medicines that may be causing harm and/or no longer providing benefit. Preliminary findings imply that whilst some deprescribing changes initiated in hospital are sustained post-discharge, other changes are reversed after discharge. It is however unknown, why some changes are sustained and why others are reversed.

We are seeking a Pharmacy Honours student to address this gap through undertaking interviews with different medication management stakeholders such as patients/ carers and clinicians including medical staff and pharmacists. Questionnaires will explore reasons behind and factors facilitating the sustainability of in-hospital deprescribing post-discharge. Once perspectives of the different medication management stakeholders involved in the care of each patient are obtained, these can be aligned to undertake an in-depth case series analysis for each patient. This project will provide exposure to the hospital system including working in a multidisciplinary team environment and communicating with patients/ carers and clinicians. It will also allow exposure to qualitative data analysis and in-depth case series analysis.

Techniques/Methods: literature review, interviews with medication management stakeholders including patients/ cares and clinicians, qualitative data analysis, case series analysis, manuscript writing

Selected Publication: Masnoon, N, Lo, S, Hilmer, S. A stewardship program to facilitate anticholinergic and sedative medication deprescribing using the drug burden index in electronic medical records. *Br J Clin Pharmacol* 2023; 89(2): 687-698.

Dr Slade Matthews

Research Passion – I work at the intersection of biological and computer science and I am passionate about finding ways in which artificial intelligence can be applied to pharmacology and toxicology.



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- **Research Group:** cptlaboratory.org

Project: Could it have been predicted? Predicting aftermarket toxicity with Python-based machine learning models

Co-Supervisor: Helen Ritchie

Project Summary: In this project we will develop a series of safety pharmacology models using python based cheminformatic tools such as Rdkit, Scikitlearn, and pytorch. We want to see if machine learning cheminformatic toxicity models can single out the molecules that were ultimately removed from the market. I have collected a database of drugs that were withdrawn from the market due to toxicity for various reasons. This can be combined with a database of currently available medications to form a test set which can be used to test a model designed to predict toxicity. Many of the drugs that have been withdrawn over the years were withdrawn due to hepatotoxicity or DILI (drug induced liver injury) so I have collected a dataset of molecules with BSEP binding values to develop a model capable of predicting hepatotoxicity. This will be the first model. If time allows, we will also gather data on other toxicities responsible for drug withdrawal such as binding the HERG (IKr) associated protein and potentially other secondary pharmacology assay targets such as Gprotein-coupledreceptors (GPCRs), enzymes, kinases, nuclear hormone receptors, ion channels and transporters.

Techniques/Methods: Toxicological QSAR model development, Python based cheminformatic techniques, data management, git-hub, pytorch, scikitlearn, rdkit, pandas, numpy.

Dr Stephanie Mathieson and Professor Andrew McLachlan

Research Group Focus: Understanding optimal pain management strategies and reducing inappropriate prescribing

Dr Stephanie Mathieson (E: stephanie.mathieson@sydney.edu.au)

Senior Research Fellow, School of Health Sciences

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Location: Level 10 Kolling Institute, RNSH Hospital, St Leonards.



Project 1: Effectiveness of interventions designed to increase safe medicine disposal: a systematic review

Co-Supervisor: Professor Andrew McLachlan

Project Summary: Guidelines and policies frequently make recommendations about the quality use of medicines but are less descriptive on how to dispose of medicines safely and the promotion of safe disposal in the community. Accidental poisonings often occur from unused medicines lying around homes. Understanding interventions that have been used to increase safe medicine disposal, such as returning unused medicines to the pharmacy for destruction, can reduce the opportunity of serious intentional or unintentional harm like overdoses and deaths. This review aims to evaluate the effectiveness of interventions designed to i) reduce unwanted medicines in the community; ii) increase or promote safe medicine disposal.

Techniques/Methods: Systematic review and meta-analysis methodology

Selected Publication:

Mathieson S, Maher CG, Ferreira GE, Hamilton M, Jansen J, McLachlan AJ, et al. Deprescribing opioids in chronic non-cancer pain: systematic review of randomised trials. *Drugs*. 2020;80(15):1563-76.

Project 2: Developing clinician-focussed educational and training materials to promote safe medicine disposal

Co-Supervisor: Professor Andrew McLachlan

Project Summary: Destruction of drugs is part of routine practice and Professional Practice Standards for pharmacists. However, other clinicians are less likely to know current policies and recommendations about safe medicine disposal. Educational materials are needed to provide current information on the risks of having unused medicines at home, the environmental harm from incorrect disposal methods (e.g. in the garbage), and “myth bust” common misconceptions about safe medicine disposal. Materials will be developed targeting pharmacists (as an education “refresher”), general practitioners, specialists, nurses and allied health clinicians. Qualitative interviews will be conducted to seek feedback on the materials developed.

Techniques/Methods: content development and qualitative thematic analysis.

Selected Publication:

Hamilton M, Mathieson S, et al. Barriers, facilitators and resources to opioid deprescribing in primary care: experiences of general practitioners in Australia. *PAIN* 2021;163:e518-e26.

Professor Barbara Mintzes

I am passionate about working to improve quality use of medicines to support better patient and public health. My research focuses mainly on pharmaceutical policy, including factors driving benefits and harms of medicines and quality of use. I also carry out systematic reviews and population-based research on benefits and harms of drug treatments.



I am passionate about working to improve quality use of medicines to support better patient and public health. My research focuses mainly on pharmaceutical policy, including factors driving benefits and harms of medicines and quality of use. I also carry out systematic reviews and population-based research on benefits and harms of drug treatments.

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Research Group: The Evidence, Policy & Influence Collaborative (EPIC) at CPC, a vibrant multi-disciplinary team; in my immediate team - 4 pharmacy PhD students; 1 research assistant.

Project 1: Uncertainty about benefits of cancer medicines and their post-market safety

Co-Supervisors: Eliza McEwin, PhD Candidate, and Ashleigh Hooimeyer, PhD Candidate

Project Summary: Cancer medicines are often approved with limited pre-market trial evidence, leading to uncertainties about treatment benefits and harm, especially on rare serious adverse effects. There has been no research on how well this uncertainty is communicated to clinicians and patients or how it affects post-market safety oversight. This project will classify new cancer medicines approved in Australia between 2013 and 2022 according to availability of research evidence at approval on overall survival, quality of life, and adverse events. Two key questions will be addressed: first, is greater uncertainty about treatment outcomes associated with more post-market safety warnings? Secondly, how well is this uncertainty communicated to clinicians and patients in Product Information (PI) and Consumer Medicines Information (CMI)? The student will work closely with two PhD candidates working on related research.

Techniques/Methods: Instrument design using the program RedCAP; content analysis; descriptive statistical analysis, data coding and analysis; (methods taught; no expected prior technical experience).

Project 2: Patient representation in medicines reimbursement: an international comparison

Co-Supervisor: Dr Alice Fabbri, Department for Health, University of Bath, UK

Project Summary: There is increasing attention to the need for patients' preferences and priorities to be considered in health technology assessments (HTA) of medicines and reimbursement decisions, but little assessment to date of how patients' views are sought or incorporated into decision-making. This project includes a review of information on HTA agencies' websites and development and conduct of a survey of HTA agencies. The survey will ask about governance of patient representation, including how representatives are selected, access to research evidence, conflict of interest policies, and methods to incorporate patient views into decision-making. It will include HTA agencies in Australia, New Zealand, the UK, Canada and 27 national members of the European Network of HTA agencies.

Techniques/Methods: Survey design and conduct including instrument design, piloting, recruitment, survey conduct and analysis (methods to be taught; no expected prior technical experience).

Professor Rebekah Moles

Rebekah's research focuses on medication safety, particularly in vulnerable groups of patients. She is working on some large clinical trials currently.

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- **Academic Profile:** [Professor Rebekah Moles \(sydney.edu.au\)](https://sydney.edu.au)



Project: Preventing medication-related readmissions to regional hospital: a First Nations perspective (May be based in Dubbo)

Co-Supervisors: Dr Jon Penm, Dr Stephen Carter

Project Summary: Improving medication safety at these transitions is one of three flagship areas of the World Health Organisation Global Patient Safety Challenge: Medication Without Harm.¹ In Australia, an estimated 250,000 hospital admissions per year are medication-related, costing \$1.4 billion per year.² Regional areas in particular have higher rates of medication-related readmissions and the proportion of patients identifying as First Nations is higher in these regions. This project aims to review issues and perspectives from key stakeholders/patients on how to implement a discharge service for First nations' patients to reduce medication-related readmissions to hospital.

Techniques/Methods: Mixed methods.

Selected Publications:

1. World Health Organization. Medication safety in transitions of care: technical report. World Health Organization; 2019.
2. Pharmaceutical Society of Australia 2019. Medicine Safety: Take Care. Canberra: PSA.

Dr Jennifer Ong

Jennifer is a registered pharmacist and academic at the University of Sydney. She is involved in teaching and curriculum development for palliative care at the University of Sydney Pharmacy School. Her research is focused on the delivery of high-quality care to people at the end-of-life in a holistic manner through pharmacological and non-pharmacological approaches. She is interested in multidisciplinary care, compassionate communities and a public health approach to palliative care.



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Project: Drug burden and performance status in the palliative care setting: A retrospective study

Co-Supervisor: Hala Musa, Michael Soriano

At the end of life, loss of patient dignity results from a complex interplay and deterioration of a person's sense of their own physical, psychological, social and spiritual wellbeing.^{1,2} In the clinical setting, this may be deduced from as a person's performance status which refers to their ability to independently perform activities of daily living (such as eating, mobility, transfers and toileting) which in the worst cases have led to a desire to hasten death.³⁻⁵ Maintenance and preservation of a person's ability to live independently and with dignity often requires a multidisciplinary approach. The role of the pharmacist includes ensuring palliative medicines are prescribed judiciously for adequate alleviation of symptoms whilst minimising adverse drug reactions which could contribute to drug burden and impaired performance status.^{6,7} Hence, the aim of this project is to determine the prevalence of polypharmacy, potential inappropriate medications (PIMs), definitely not for comfort (DNC) medications and drug burden index (DBI) for people receiving palliative care and elucidate their impact on primary outcomes including performance status, activities of daily living and personal dignity. Secondary outcomes include rate of voluntary assisted dying VAD requests, falls, number of hospital admissions.

References and student pre-reading:

1. Chochinov HM, Hassard T, McClement S, et al. The Patient Dignity Inventory: A Novel Way of Measuring Dignity-Related Distress in Palliative Care. *Journal of Pain and Symptom Management* 2008; 36: 559-571.
2. Albers G, Pasma HRW, Deliens L, et al. Does Health Status Affect Perceptions of Factors Influencing Dignity at the End of Life? *Journal of Pain and Symptom Management* 2013; 45: 1030-1038.
3. Vissers S, Dierickx S, Deliens L, et al. Characteristics and outcomes of peer consultations for assisted dying request assessments: Cross-sectional survey study among attending physicians. *Frontiers in Public Health* 2023; 11. Original Research. DOI: 10.3389/fpubh.2023.1100353.
4. Selby D, Bean S, Isenberg-Grzeda E, et al. Medical Assistance in Dying (MAiD): A Descriptive Study From a Canadian Tertiary Care Hospital. *American Journal of Hospice and Palliative Medicine* 2020; 37: 58-64. DOI: 10.1177/1049909119859844.
5. Li M, Watt S, Escaf M, et al. Medical assistance in dying—implementing a hospital-based program in Canada. *N Engl J Med* 2017; 376: 2082-2088.
6. Gnjdic D, Hilmer SN, Blyth FM, et al. High-Risk Prescribing and Incidence of Frailty Among Older Community-Dwelling Men. *Clinical Pharmacology & Therapeutics* 2012; 91: 521-528.
7. Li Y, Whelan CM and Husain AF. Deprescribing in the Home Palliative Setting. *Journal of Palliative Medicine* 2020; 24: 1030-1035. DOI: 10.1089/jpm.2020.0376.

Dr Jessica Pace

I am a health policy and health services researcher with current hospital pharmacy practice experience. My research interests are in using empirical bioethics (combining qualitative methods with theoretical ethical analysis) to find practical solutions to morally complex problems relating to medicines access and regulation, as well as pharmacy education, learning, and assessment.



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Co-Supervisor: Dr Jack Collins

I am a pharmacy practice and health services researcher with current community pharmacy practice experience. My research interests include policy, self-care of minor ailments, health equity, and mental health.



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Project: Exploring community pharmacists' experiences of regulatory change

Project Summary: Community pharmacists are required to practice lawfully under a number of regulatory provisions, including Poisons and Therapeutic Goods and Health Practitioner regulations. In recent years, there have been a number of changes to the regulations governing community pharmacy practice, facilitated in part by the bushfires of the 2019-2020 summer and the COVID-19 pandemic. Little is known about how pharmacists' practice is impacted by these regulatory changes and how pharmacists keep up-to-date with rapidly changing regulation. In Semester 1, the student will conduct a review of relevant literature. In Semester 2, semi-structured interviews with community pharmacists will be conducted to elicit their experiences of regulatory change.

Techniques/Methods: In Semester 1, the student will conduct a review of relevant literature. In Semester 2, the student will conduct semi-structured interviews with community pharmacists to qualitatively explore their experiences of regulatory change.

Dr Jonathan Penm

Dr Penm's research focuses on improving hospital pharmacy services and the use of high-risk medicines, such as opioid medications and antimicrobials, in the hospital setting. Dr Penm is interested in health service research that focuses on developing and implementing evidence informed strategies and system level-interventions (e.g. education, policy, technology) to improve the use of medicines and minimise medication-related harms.



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Project 1: Preventing medication-related readmissions to regional hospital: Qualitative interviews with clinicians (May be based in Dubbo)

Co-Supervisors: Prof Rebekah Moles and Dr Stephen Carter

Project Summary: Improving medication safety at these transitions is one of three flagship areas of the World Health Organisation Global Patient Safety Challenge: Medication Without Harm.¹ In Australia, an estimated 250,000 hospital admissions per year are medication-related, costing \$1.4 billion per year.² Regional areas in particular have a higher rate of medication-related readmissions. This project aims to explore clinician perceptions on how to implement a discharge service to reduce medication-related readmissions to hospital.

Techniques/Methods: Qualitative analysis. NVivo to assist with thematic analysis.

Selected Publication:

1. World Health Organization. Medication safety in transitions of care: technical report. World Health Organization; 2019.
2. Pharmaceutical Society of Australia 2019. Medicine Safety: Take Care. Canberra: PSA.

Project 2: Preventing medication-related readmissions to regional hospital: Descriptive study (May be based in Dubbo)

Co-Supervisors: Prof Rebekah Moles and Dr Stephen Carter

Project Summary: Improving medication safety at these transitions is one of three flagship areas of the World Health Organisation Global Patient Safety Challenge: Medication Without Harm.¹ In Australia, an estimated 250,000 hospital admissions per year are medication-related, costing \$1.4 billion per year.² Regional areas in particular have a higher rate of medication-related readmissions. This project aims is a cross sectional study identifying proportion of medication-related readmissions to hospital and their associated risk factors.

Techniques/Methods: Quantitative analysis. SPSS for statistics.

Selected Publications:

1. World Health Organization. Medication safety in transitions of care: technical report. World Health Organization; 2019.
2. Pharmaceutical Society of Australia 2019. Medicine Safety: Take Care. Canberra: PSA.

Dr Rebecca Roubin

Dr Roubin's research focuses on innovative Digital Health assessments and Pharmacy education.

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Project: 'How to' implement digital health tools for pharmacy students and practitioners
Co-Supervisor: Prof Bandana Saini

Project Summary: Digital tools are rapidly evolving as an indispensable in enhancing health outcomes, streamlining healthcare systems, and expanding access to care (FIP 2021). A key gap in digital health education is the skillset and knowledge of how to apply digital tools to solve existing clinical problems and improve care for their patients. Pharmacy students and practitioners need clear, actionable guidance on how to integrate these tools into their practices. Experts outside of the healthcare space shape digital tools and this is an opportunity for interdisciplinary collaboration to develop a digital health education resource.

You will evaluate the published literature on existing guidance materials and implementation best practices. You will co-design and pilot the guide and assessment with a select group of students, practitioners, and interdisciplinary experts, refining based on feedback. This work will contribute to a publication (e.g., in Am J Pharm Ed, BMC Medical Education or J Am Pharm Assoc.)

Techniques/Methods: Scoping review, co-design how-to guide, focus groups.

Selected Publications: International Pharmaceutical Federation (FIP). FIP Digital health in pharmacy education. The Hague: International Pharmaceutical Federation; 2021

Associate Professor Claire O'Reilly

We are pharmacists and mental health researchers at Sydney Pharmacy School who are passionate about mental health, education and pharmacy services research. Our research team focusses on equipping future healthcare professionals with the skills needed to confidently care for people experiencing mental health problems and crises, and developing the evidence base for pharmacist-led mental health services.



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- **Research Group:** 4 PhD students, honours students and research assistants

Project: Exploring psychotropic medication use among young people using a youth mental health service

Co-supervisors: Dr Sarira El-Den and Dr Jack Collins

Project Summary: headspace is the National Youth Mental Health Foundation which provides early intervention mental health services to 12-25-year-olds. They support young people with mental health, physical health (including sexual health), alcohol and other drug services, as well as work and study support. With a focus on early intervention, headspace works with young people to provide support at a crucial time in their lives – to help get them back on track and strengthen their ability to manage their mental health in the future. This project involves a collaboration between Sydney Pharmacy School mental health researchers and clinicians and researchers at headspace Camperdown. This project will explore stakeholders' views of medication use among young people who use youth mental health services and pharmacists' potential roles within youth mental health services. As medications are a treatment modality for mental illness, we are conducting this study to understand stakeholders' perspectives of pharmacists' potential roles in supporting young people who receive care from youth mental health services.

Techniques/Methods:

- Systematic review exploring psychotropic medication use among young people
- Semi-structured interviews with stakeholders exploring the role of the pharmacist in youth mental health services

Selected Publications:

1. Ng, R., El-Den, S., Stewart, V., Collins, J. C., Roennfeldt, H., McMillan, S. S., Wheeler, A.J., O'Reilly, C. L. (2022). Pharmacist-led interventions for people living with severe and persistent mental illness: A systematic review. *Aust N Z J Psychiatry*, 56(9), 1080-1103.
2. Collins JC, Ng R, McMillan SS, Hu J, O'Reilly CL, Wheeler AJ, El-Den (2023). Psychological distress in community-dwelling individuals living with severe and persistent mental illness. *International Journal of Social Psychiatry*. 2023; 69(6), 1327-1334.

Professor Bandana Saini

Research Passion: respiratory & sleep pharmacy health services research

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- **Research Group:** Pharmacy Practice (Sydney Pharmacy School), Sleep and Circadian Group at the Woolcock Institute of Medical Research, and Asthma Australia



Project 1: Airing out pharmacists' roles in minimising the environmental impact of inhalers used by patients with respiratory conditions

Co-Supervisors: Dr Philip Kwok and Hon Professor Iman Basheti (Sydney Pharmacy School)

Project Summary: Millions of inhalers are used daily by a third of all Australians living with chronic respiratory disease. Inhaler devices utilise either aerosol technology, dry powder formulations or soft mist generation for drug delivery to the lungs, all of which have an impact on the environment, though dry powder inhalers probably likely have the least impact. Pharmacists are trained in both *formulation science* as well as *clinical management* and should have the knowledge to best match inhalers for a patient based on the patient's disease characteristics and the formulation characteristics of the inhaler - to optimise environmental impact whilst maintaining best treatment outcomes. It is unclear if this is currently a role pharmacists undertake or are confident about.

Techniques and methods: The aim of this project will be to conduct a digital **national, cross-sectional survey** of Australian pharmacist practitioners to explore their awareness of the environmental impact of inhalers, their confidence in undertaking review of prescribed inhalers for best 'fit' with the patient characteristics as well as environmental impact, willingness to assist in inhaler recycling services should these exist, and their training needs/preferences on this topic. Survey data will be analysed statistically.

Selected Publication: Montgomery BD, Blakey JD. Respiratory inhalers and the environment. *Aust J Gen Pract.* 2022 Dec;51(12):929-934. **PROJECT 1 IS LINKED WITH AN ASTHMA AUSTRALIA HONOURS SCHOLARSHIP (\$6000)**

Project 2: Treatment Experience of people living with Narcolepsy

Co-Supervisors: Dr Sheila Sivam (Staff Specialist RPAH (Respiratory and Sleep Physician)) and Dr Elizabeth Cayanan (School of Health Sciences, Faculty of Medicine and Health)
This is a Sleep Health Clinical Academic Group Project (USyd and Sydney Health Partners).

Project Summary: Narcolepsy, although a rare condition can have a profound impact on the quality of life of patients. Pharmacists have a key role in the management of narcolepsy as patients will likely have a range of co-morbid conditions requiring wakefulness medicines to be used with key attention to safety of use. Further, Australia lags behind in having evidence-based medicines for narcolepsy available on the market or accessible to patients, such that drugs like amfetamines are still used as first line treatments. It is important to understand the perspectives of Australians living with narcolepsy about their treatment experience to inform regulatory policies and advocate for access to better treatment options.

Techniques/Methods: we will use qualitative exploratory methods to undertake this research. Semi-structured interviews will be conducted with patients with narcolepsy who consent to participate. Interviews will be transcribed verbatim and analysed inductively for emergent themes using a specialised software. The results of the study will be disseminated widely to stakeholders to advocate for better access to safer and effective medicines for narcolepsy treatment in Australia.

Selected Publication: Sivam S, Chamula K, Swieca J, Frenkel S, Saini B. Narcolepsy management in

Dr Geeta Sandhu (St Vincent's Hospital), Dr Sophie Stocker and Professor Andrew McLachlan

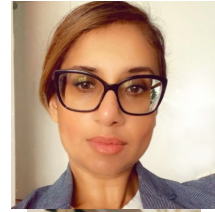
Research Focus: Impact of dosing guidelines on real-world clinical practice

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Project 1: Impact of ADDIKD guidelines in carboplatin dosing and outcomes

Co-Supervisors: Dr Sophie Stocker, Professor Andrew McLachlan

Collaborator: Dr Venessa Chin, Medical Oncologist, St Vincent's Hospital

Project Summary: The International Consensus Guideline for Anticancer Drug Dosing in Kidney Dysfunction (ADIKD) have now been implemented. This study will use a pre / post audit study design to investigate carboplatin outcomes following ADIKD guideline implementation at St Vincent's Hospital, Sydney. Preliminary investigation indicates estimated creatinine clearance (CrCl) has been switched to BSA-adjusted eGFR for carboplatin dosing but there has been almost no dose reduction on cycle 2 of treatment. Previously studies found 40% of patients have dose adjustments on the 2nd cycle due to toxicities. This is a real world study of cancer treatment outcomes based at St Vincent's Hospital.

Techniques/Methods: Observational retrospective study (pre / post audit). Ethical approval has already been obtained. This project is based at St Vincent's Hospital in Darlinghurst, Sydney.

Selected Publications: International Consensus Guideline for Anticancer Drug Dosing in Kidney Dysfunction (link here <https://www.eviq.org.au/pages/international-consensus-guideline-for-anticancer-d>)

Project 2: Optimal timing of subcutaneously administered granulocyte colony stimulator factor in solid tumours

Co-Supervisors: Dr Sophie Stocker, Professor Andrew McLachlan

Collaborator: Catherine Bilmon, Senior Cancer Pharmacist, St Vincent's Hospital

Project Summary: This project will investigate if administering pegylated-granulocyte colony stimulating factor (peg G-CSF) on the day of chemotherapy finishing in solid tumour protocols i.e., FOLFIRINOX/ FOLFOXIRI. There's been a trend since COVID for oncologists to prescribe peg G-CSF on the day of the 5-fluorouracil pump disconnect for patient convenience rather than 24 hours after as per international guidance on administration of G-CSF. This study will investigate if there are particular adverse events i.e., breakthrough neutropenia, myalgia related to timing of peg G-CSF administration post chemotherapy.

Techniques/Methods: Observational retrospective study of medical records. This project is based at St Vincent's Hospital in Darlinghurst, Sydney.

Selected Publication: https://ascopubs.org/doi/abs/10.1200/JCO.2018.36.15_suppl.e16190
<https://pubmed.ncbi.nlm.nih.gov/32386071/>

Dr Mouna Sawan and Associate Professor Danijela Gnjidic

Dr Mouna Sawan is a Dementia Centre for Research Collaboration (DCRC) Research Fellow and a registered accredited pharmacist. Our research program focuses on codesigning resources to support people with dementia and carers in medication management to improve the quality use of medicines. Our research is funded by the Medical Research Future Fund.



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- **Research Group:** Multi-disciplinary research group including 1 PhD student, 2 research assistants.

Project: Co-designing medication management guidance resources for people with dementia and their carers

Co-Supervisor: A/Prof Danijela Gnjidic

Project Summary: People living with dementia are more likely to be exposed to inappropriate polypharmacy and experience worse outcomes than people without a dementia. Carers play an important role in overseeing medications for the person with dementia. This research aims to codesign resources for people living with dementia and their cares to improve medication management guidance cross care transitions.

Techniques/Methods: The developed resources will undergo user-testing over approximately two rounds. This will involve a reiterative design process including structured and semi-structured interviews to evaluate consumers' ability to locate, understand and act on information in the resource.

Selected Publication: Sawan et al BMJ Open 2022 Vol. 12 DOI: 10.1136/bmjopen-2021-058237

Associate Professor Carl Schneider

Current research interests involve optimising the Quality Use of Medicines via health services implementation. I am also interested in clinical decision making and health professional education.



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- **Research Group:** We currently supervise seven higher degree of research students and have a very collegial atmosphere. Sydney Pharmacy School hosts one of the largest groups of Social Pharmacy researchers in the world.

Project: Exploration of medication management stakeholder communication in the Australian primary care setting via social network analysis

Co-Supervisors: Prof Tim Chen and Dr Ardalan Mirzaei

Project Summary: You will be key member of a large team of interdisciplinary investigators on the ASPIRE trial (a \$2.5M trial to implement a systems approach to medicines management- www.aspiretrial.com.au). A component of this trial to implement a multi-component, multi-level intervention to optimise the communication process for medication management. To evaluate the effectiveness of the intervention and implementation strategy, a measure of communication processes for medication management in primary care is required. This honours project shall involve conducting a social network survey and analysis to explore the network for medication management in an Australian primary care setting.

Techniques/Methods:

Social network analysis: Social network analysis is the process of quantitatively modelling social structures. We shall recruit a purposive sample of stakeholders (with varying disciplines, roles and practice experience) at four study sites to complete an interviewer-guided social network questionnaire. Following data collection, a social network analysis will be conducted using R.

Selected Publications:

- i) Creswick N, Westbrook JI. Social network analysis of medication advice-seeking interactions among staff in an Australian hospital. *International journal of medical informatics*. 2010 Jun 1;79(6):e116-25.
- ii) Haruta J, Tsugawa S, Ogura K. Exploring the structure of social media application-based information-sharing clinical networks in a community in Japan using a social network analysis approach. *Family Medicine and Community Health*. 2020;8(4).
- iii) Bae SH, Nikolaev A, Seo JY, Castner J. Health care provider social network analysis: a systematic review. *Nursing outlook*. 2015 Sep 1;63(5):566-84.

Dr Sophie Stocker

My research focuses on understanding variability in response to medicines and how this can be managed to optimise patient care. I utilise a diverse range of quantitative (ethnopharmacology, pharmacogenomics, therapeutic drug monitoring, pharmacometrics) and qualitative (interviews, surveys) approaches to evaluate the impact of intrinsic and extrinsic factors on drug disposition, efficacy and safety.



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- **Research Group:** Multidisciplinary research team includes 4 PhD students, 2 SOMS Honours students

Project: Implementation of HLA-B*5801 testing in an ethnically diverse urban population with gout

Co-Supervisor: Dr Stephen Hughes

Project Summary: Allopurinol is the most common urate-lowering medication prescribed in Australia for gout. Whilst it is effective, it can cause severe cutaneous adverse reactions (SCAR) and allopurinol hypersensitivity syndrome (AHS). The risk of developing SCAR from allopurinol is between 1:250 to 1:1000, with mortality rates of up to 25%. The presence of the HLA-B*5801 gene is associated with a higher risk of SCAR and AHS. Screening for HLA-B*5801 in patients with gout prior to initiating allopurinol significantly reduces the incidence of SCAR and AHS. Screening is recommended before initiating allopurinol in many guidelines, particularly in populations of Han Chinese descent, where the association between HLA-B*5801 and allopurinol induced adverse drug reactions (ADRs) is significantly higher than other populations. Despite this recommendation, few people are screened for HLA-B*5801 before starting allopurinol. This project aims to develop and deliver a community pharmacist led HLA-B*5801 screening service in people initiating allopurinol to prevent severe ADRs.

Techniques/Methods: We will conduct a mixed-methods study where qualitative and quantitative data will be collected to provide insights into the optimal deliver of the pharmacist-led pharmacogenomics service. A systematic literature review will be conducted to inform the design of the service. Consultation with community pharmacists and pharmacogenomic testing service will also be conducted. Pharmacogenomic testing will be delivered through selected pharmacies to eligible patients. The impact of testing on clinical outcomes (ADRs avoided) and economic impacts will be evaluated. Semi-structured interviews with key stakeholders will be performed to inform ongoing service improvements. Study findings will be disseminated with a peer-reviewed manuscript.

Selected publications:

Stäubli CK et al. A Guide to a Pharmacist-Led Pharmacogenetic Testing and Counselling Service in an Interprofessional Healthcare Setting. *Pharmacy (Basel)*. 2022 Jul 19;10(4):86.

Tse T et al. Allopurinol for gout: Consider the case for limited HLA-B*5801 screening. *Aust J Gen Pract*. 2022 Oct;51(10):813-814.

Dr Edwin Tan

I am passionate about healthy ageing and the important role medications can play in this. My research interests are in pharmacoepidemiology, pharmacy practice, quality use of medicines, and cognitive health and ageing.

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- **Research Group:** 2 PhD, 1 MPhil, 2 Honours, 1 data analyst



Project: Using big data to improve medication safety in people with dementia

Co-Supervisors: Prof Christine Lu, PhD Candidates Edward Lau and Ilsa Wojt

Project Summary: People with dementia often have multimorbidity and take multiple high-risk medications, such as psychotropics. This places them at an increased risk for adverse drug events, hospitalisation and mortality. Disparities in prescribing may also exist for certain patient subgroups, including those from lower socioeconomic, culturally and linguistically diverse (CALD) and Aboriginal and Torres Strait Islander (ATSI) backgrounds. This study will investigate the patterns, risk factors and outcomes of high-risk prescribing in people with dementia. This study will involve analysis of linked data from national administrative datasets (e.g. PBS, MBS) and health surveys. Findings from this study will help optimise prescribing and enable interventions to be targeted to those patient groups most at risk.

Techniques/Methods: This project would be suited to students with a keen interest in big data science, epidemiology, medication safety and geriatric pharmacy.

Associate Professor Fanfan Zhou

My research group is an motivated team with PhD students, visiting scholars/students and honors students. Our research is primarily focused on two themes: 1) drug discovery and development for human eye diseases and cancers; 2) drug design and optimisation targeting human Solute Carrier Transporters that control drug uptake into tissues. I have established a research consortium that includes national and international experts in these two fields and welcome you joining our group.



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- **Research Group:** High-degree research students, visiting scholars/students and honors students

Project: Discover new drugs to treat human Uveal melanoma (UM)

Co-Supervisor: Prof. Michael Murray, A/Prof. Ingrid Gelissen

Project Summary: Uveal melanoma (UM) accounts for ~85% of all ocular melanomas in humans. Up to 50% of patients develop metastatic disease that has a poor survival of <18 months. By screening natural compounds and their derivatives that are available in our laboratory, we will identify potential drug candidates with activity against human UM cells and UM metastasis. It is expected that these compounds target specific cellular organelles to exert their anti-cancer effects. In this project we will use a range of modern molecular and biochemical approaches to define the detailed mode of action of these candidate molecules in combating UM growth and invasion. The molecular targets for these candidate compounds in UM will be identified. This study will utilize established UM cell lines and primary UM tumor-derived cell cultures that represent a unique resource available to our group. The findings from this project will provide critical pre-clinical data to justify the therapeutic application of the natural compounds or their derivatives as potential treatments for UM.

Techniques/Methods: tissue culture, cell viability and cell death assays, western blotting, flow cytometry

Selected Publication: Cell Oncol (Dordr). 2022 Aug;45(4):601-619 & FEBS 2021 Apr 10. doi: 10.1111/febs.15869.