THE UNIVERSITY OF SYDNEY

Honours Projects

2019

School of Pharmacy

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Professor Jan-Willem Alffenaar
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Location: Westmead hospital

Professor Jan-Willem Alffenaar is a hospital pharmacist and clinical pharmacologist. His research focuses on personalized dosing of antimicrobial drugs to optimize efficacy and reduce toxicity. Therapeutic drug monitoring, pharmacokinetic modelling in combination with limited sampling strategies and dried blood spot sampling are tools to achieve these goals.

Academic Profile https://www.rug.nl/staff/j.w.c.alffenaar/research

Research Group Group in the Netherlands in 2018: 3 post docs, 20 PhD students, 3 Honours students

Project 1: Evaluation of therapeutic drug monitoring of azole antifungal agents

Co-Supervisor: Dr Jonathan Penm
Project Summary: Invasive fungal infections have a high morbidity and mortality if not treated adequately. Azole antifungal drugs like fluconazole, voriconazole and posaconazole are the cornerstone of treatment of many invasive fungal infections. Because of the large pharmacokinetic variability of azole antifungal drugs therapeutic drug monitoring is performed to increase efficacy and reduce toxicity. Due to the increased number of patients at risk for invasive fungal infections (i.e. immunocompromised patients, COPD, ICU) a reassessment of the current TDM practises is urgently needed. This will include a literature review as well as an evaluation of clinical practise in Westmead hospital. The results of the project could have an impact on antimicrobial stewardship practises. More over the clinical evaluation could show that specific subgroups of patients are at risk for low drug exposure and could benefit from higher dosing from start of treatment [van der Elst et al CID 2014].

Methods: This project may involve a range of techniques including systematic literature search, retrospective data collection from medical records, data entry and data analysis (including PK modeling)

Project 2: Therapeutic drug monitoring of clofazimine in Multidrug Resistant Tuberculosis

Co-Supervisor: Dr Jonathan Penm
Project Summary: Treatment outcome of multidrug resistant tuberculosis is poor. Globally a success rate of 50% is achieved with even poorer outcome in patients with extensive drug resistant tuberculosis (25% success rate). Because of the poor treatment outcome the World Health Organisation has established a PK/PD task force to optimize dosing of the drugs used to treat this infectious disease. For clofazimine it was recently shown that the drug improved outcome [Duan et al CMI 2018]. However, little is known about the optimal dose or PK/PD targets [WHO report 2018]. Literature will be studied to combine data from in vitro, in vivo and human studies to propose the optimal dose and PK/PD target. As therapeutic drug monitoring of clofazimine is already applied in Westmead hospital the clinical data will be used to investigate the pharmacokinetic variability and subsequent treatment outcome and adverse drug reactions which will help to define the therapeutic window. Results of this project could have an impact on WHO dosing recommendations.

Methods: This project may involve a range of techniques including systematic literature search, retrospective data collection from medical records, data entry and data analysis (including PK modeling)

References: van der Elst et al Clin Infect Dis. 2014 Dec 1;59(11):1527-33; Duan et al Clin Microbiol Infect. 2018 Jul 20. pii: S1198-743X(18)30530-5; WHO. Technical report on the pharmacokinetics and pharmacodynamics (PK/PD) of medicines used in the treatment of drug-resistant tuberculosis. Geneva, Switzerland: Global TB Programme, 2018.

Professor Parisa Aslani
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My goal is to improve quality use of medicines by patients/consumers through increased and appropriate disease and medicine information, informed shared decision making, and adherence to therapy; using pharmacists as the primary professionals delivering health services. My research has impacted policy and education in the healthcare sector, and at the Commonwealth Government level, and has led to a global initiative on developing medicine information strategies for implementation at national and local levels.

Academic Profile http://sydney.edu.au/pharmacy/about/people/profiles/parisa.aslani.php

Research Group 1 post-doctoral fellow; 5 PhD students

Project: Improving written discharge medication information for culturally and linguistically diverse communities

Co-Supervisor: Dr Vivien Tong

Project Summary: This project aims to develop clear and understandable written discharge medication informationin several languages to be used in culturally and linguistically diverse communities by pharmacy staff.

The project steps are to:

a) Identify commonly used dosage instructions, dose forms, and discharge medication information.

This step will be conducted through an evaluation of hospital dispensing programs/systems, review of literature, and expertise of the research team and advisory committee.

b) Set up an advisory committee that will assist with obtaining a more comprehensive understanding of current international best practice for written discharge medication information, and facilitate translation of information.

c) Develop clear and understandable English language written discharge medication information which can be understood and acted upon by people with low health literacy.

d) Translate the developed written discharge medication information into the top 10 most commonly spoken languages other than English in a CALD metropolitan region within Australia.

Step c) and d) will involve drawing on the skills and expertise of the research team to develop effective prescription medicine labels and discharge medication lists, which, with the assistance of the advisory committee, will be translated into the selected languages, and verified for accuracy and contextualisation. All translations will be verified by qualified interpretors.

e) Evaluate the comprehension and usability of the translated information within CALD settings and participants, via the User Testing method.

Methods: Information design and evaluation

Associate Professor Thomas Balle
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Location: Brain and Mind Centre

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

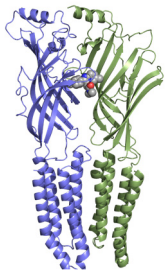
Academic Profile http://sydney.edu.au/pharmacy/about/people/profiles/thomas.balle.php

Research Group Ion Channel Drug Discovery, Brain and Mind Centre

Project 1: Structure based drug design: Beyond classical benzodiazepines

Co-Supervisor: A/Prof. Philip Ahring

Project Summary: Benzodiazepines are allosteric modulators of $GABA_A$ receptors and are amongst the most widely prescribed drugs for the treatment of insomnia and anxiety disorders. Their use, however, is limited by side effects and risk of drug dependence. addition to overcoming the limitations of classical benzodiazepines, subtype selective drugs might also be valuable for novel indications, such as analgesia, depression, schizophrenia, cognitive enhancement and stroke. In this project we will use computational chemistry and structure based drug design techniques to develop receptor and pharmacophore models to be used in high throughput virtual screening for novel potential therapeutics that selectively target individual subtypes of α1, α2 and α3 $GABA_AR$s.

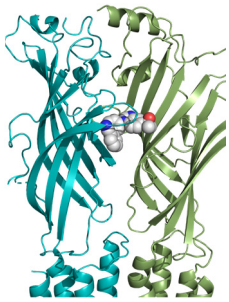


Methods: High performance computing, structure based drug design, 3D-visualisation, molecular modelling, pharmacophore modelling, docking, molecular dynamics simulations

Project 2: Structure based drug design: Benzodiazepines as memory enhancers

Co-Supervisor: A/Prof. Philip Ahring

Project Summary: Numerous studies in animals and humans show that classical benzodiazepines, which are positive allosteric modulators (PAMs) of $GABA_A$ receptors, impair memory and learning. This raises the question if negative allosteric modulators (NAMs) might have the opposite effect, *i.e.* be cognitive enhancers. In this project we will pursue the α 5 $GABA_AR$ which is highly expressed in the hippocampus, an area of the brain important for memory and learning. During the project we will develop and evaluate homology models of α5 containing $GABA_A$Rs and develop pharmacophore and receptor binding models to be used in high throughput virtual screening. If time allows we will also study the dynamic differences between PAMs and NAMs using molecular dynamics simulations.



Methods: High performance computing, structure based drug design, 3D-visualisation, molecular modelling, pharmacophore modelling, docking, molecular dynamics simulations

References: Rudolph & Knoflach, Nat. Rev. Drug. Discov., **2012**, 10, 685-697
Zhu et al., *Nature*, **2018**, 559, 67–72

Dr Rose Cairns
rose.cairns@sydney.edu.au

My research focus is in poisoning, clinical toxicology, and epidemiology. I am a practicing poisons information specialist, my clinical work involves providing poisoning advice to healthcare professionals and members of the public at the NSW Poisons Information Centre (NSWPIC). My overall goal is to reduce harm from poisonings.

Academic Profile http://sydney.edu.au/pharmacy/about/people/profiles/rose.cairns.php

Project 1: Chronic lithium toxicity: risk factors, symptoms and management

Co-Supervisors: Jared Brown (NSWPIC), Prof. Nicholas Buckley (Pharmacology)
Project Summary: Lithium is a mood stabiliser used for bipolar disorder. Careful attention to dosing and monitoring is required due to its narrow therapeutic index and the risk of severe neurotoxicity (manifesting as confusion, ataxia and seizures). Toxicity from therapeutic use of lithium occurs when renal lithium excretion is impaired. This can be due to lithium induced nephrogenic diabetes insipidus, dehydration due to inter-current illness, or drug induced renal impairment. Dialysis is indicated in severe toxicity to increase lithium clearance. Patients with chronic lithium toxicity often require long hospital stays, and some patients have incomplete recovery, with persistent cognitive and cerebellar dysfunction [1].

This study will use poisons centre data on chronic lithium toxicity to characterise precipitating factors (including interacting drugs), serum lithium concentrations, symptoms present, and treatment.

Methods: Retrospective data collection from poisons centre records and hospital medical records; data entry, data visualisation and analysis.

Project 2: Using poisons centre data to evaluate medicines scheduling changes

Co-Supervisors: Jared Brown (NSWPIC), Prof. Nicholas Buckley (Pharmacology)
Project Summary: Up-scheduling can be a useful strategy to reduce misuse and harm from pharmaceuticals. An important part of pharmacovigilance is evaluating the effects of these changes. Recent examples include the up-scheduling of alprazolam to Schedule 8, due to increasing evidence of abuse. We demonstrated that this measure reduced alprazolam prescribing and intentional alprazolam poisonings [2]. In 2010 the TGA up-scheduled codeine from Schedule 2 to Schedule 3, however this did not reduce misuse reported to NSWPIC [3]. Codeine has since been made Schedule 4. This project will use poisoning, coronial and dispensing data to evaluate the effects of recent scheduling and medicines policy changes.

Methods: Epidemiology, data analysis, and data visualization.

References:
[1] Baird-Gunning J, Lea-Henry T, Hoegberg LCG, *et al*. Lithium Poisoning. *J Intensive Care Med* 2016;32(4):249-263
[2] Schaffer AL, Buckley NA, Cairns R, *et al*. Interrupted Time Series Analysis of the Effect of Rescheduling Alprazolam in Australia. *JAMA Intern Med* 2016;176:1223
[3] Cairns R, Brown J, Buckley N. The impact of codeine re-scheduling on misuse: a retrospective review of calls to Australia's largest poisons centre. *Addiction* 2016;111:1848–53

Dr Stephen Carter
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My research centres on consumers' and caregivers' engagement with pharmacists' services. I am passionate about improving consumers' use of medicines, for example enrolling patients & caregivers into medication management services. In addition, I am involved in observational research, investigating the linkage of real-time prescription records, dispensing records and patients' self-reports of medicine use. Ultimately, I aim to develop a better understanding of how to design pharmacist interventions.

Academic Profile http://sydney.edu.au/pharmacy/about/people/profiles/stephen.carter.php

Research Group Currently our group has one PhD student and one Honours student

Project 1: Does poor adherence to anti-hypertensives contribute to falls risk?

Co-Supervisors: Dr Carl Schneider and Theo Antonopoulos (MedAdvisor)
Project Summary: It has been a common understanding that taking anti-hypertensives is a falls risk. Recent meta-analysis conducted by Dr Schneider's research group[1] has shown that the falls risk due to taking antihypertensive medications is only when therapy is *initiated or changed*. This implies that once stabilised (after 7days of treatment), there is essentially no increased risk of falling. However most studies do not isolate poor adherence as an independent risk factor for falls. Given that poor adherence implies a process of continual and intermittent starting and stopping antihypertensive therapy, it is hypothesized that low adherence would increase the risk of a fall. In this project we shall use retrospective prescription data to estimate adherence. The data is made available from MedAdvisor. MedAdvisor is a company which has developed and maintains a medication management app which links the consumer with the pharmacy with over a million active users.

Methods: We will calculate the Mean Possession Ratio for adherence estimate. We will calculate the excess odds-risk of falling due to poor adherence from dispensing data.

Project 2: Will the pharmacist call the doctor about an inappropriately prescribed medicine?

Co-Supervisor: Dr Sarira El-Den
Project Summary: When dispensing prescribed medicines, pharmacists routinely check that the medicine is prescribed appropriately. If the medicine is inappropriate, for example a starting dose is too high or a drug interaction exists, pharmacists are expected to perform a clinical intervention, which can include calling the doctor to discuss. Naturally, there are barriers to intervening, including time pressures or thinking that the inappropriateness may not matter. This research explores the impact of a *social pressure* on pharmacists' decisions to call a doctor to intervene. Research by Basak et al.[2] in the United States has shown that pharmacists are less likely to call the doctor about "off-label" prescribing if the pharmacist thinks that the pharmacist-doctor relationship will be adversely affected. This effect has not been explored in an Australian context and it is likely that other factors influence pharmacists' decision-making. The research question will be explored using surveys of Australian pharmacists. The surveys will include small scenarios (vignettes) and will prompt the pharmacist to indicate whether they would call the doctor in this case.

Methods: This project uses surveys of Australian pharmacists using vignettes. It will be a cross-sectional, randomised 2 x 2 experimental design. Moderated regression analysis will be used.

References: (1) Kahlaee HR, Latt MD, Schneider CR. Am J Hypertens. 2018;31(4):467-79. (2) Basak R, Bentley JP, McCaffrey DJ, Bouldin AS, Banahan BF. Soc Sci Med. 2015;132:181-9. (3) Carter SR, Moles R, White L, Chen TF. Res Social Adm Pharm. 2015;11(2):163-75.

Dr Betty Chaar
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My research is about ethical aspects of pharmacy practice. I have led teams to explore issues in many pharmacy pathways and services. From prescribing, vaccinations, abortion etc to euthanasia, there are always new and important issues to investigate and analyse to inform better practices and guidelines for pharmacists. The more complex the issue, the more interesting.

Academic Profile http://sydney.edu.au/pharmacy/about/people/profiles/betty.chaar.php

Project 1: Australian Pharmacy and CAMs: What's really going on?

Co-Supervisors: Dr Carolina Ung, Dr Stuart Lane (Medicine), Dr Alexander Holden (Dentistry), Dr Joanna Hartnett

Project Summary: There are many sources of literature that discuss recommendations about how HCPs should handle requests for herbal medicines or complementary/alternative medicines [CAMs]; e.g. for pharmacy there is a Position Statement by the Pharmaceutical Society of Australia that documents certain expectations of pharmacists regarding the supply of CAMS. It is of great importance that pharmacist's upskill and address their professional responsibilities in relation to CAMs supply. However, it is not clear if or how any such recommendations have been adopted in the practice of pharmacy in the real world.

This "pseudo-patient" study will aim to seek a true image of what is happening in pharmacies in Australia in regards to CAMs supply.

The method adopted will be the design of a brief checklist based on recommendations proposed by professional organisations such as PSA and any notable additions from ethicists in the field. The ground researcher will seek a CAM product in randomly selected pharmacies around Sydney and use the check list to document the interaction with the pharmacist, if an interaction did occur.

Methods: This 'psuedo-patient' study will involve the student act as if a patient and request a CAM product at several pharmacies, and immediately document every action taken in the context of this request against a standardised checklist, including an open-ended description of how the 'patient' felt. Data entered will be analysed both statistically and qualitatively.

Project 2: Can we teach ethical decision making in pharmacy?

Co-Supervisor: A/Prof. Rebekah Moles

Project Summary: This project will utilise a validated survey before and after a course undertaken by students in 4th year BPharm which is based on simulation techniques. The simulated teaching course is case-based and role played in small groups to enhance discussion and learning opportunities relating to ethical principles of practice.

The PEP test [Professional Ethics in Pharmacy] is a validated instrument used to measure moral reasoning skills in pharmacy practice. We will ask students to undertake the survey before undertaking the simulated learning course and after. The data will be mostly statistical in form and will be interpreted statistically, with a few open ended questions qualitatively analysed, as we measure changes in moral reasoning skills as a result of the course undertaken.

This is a simple research project with much impact on teaching methods, students' satisfaction and competency based learning and teaching.

Methods: The student will use the validated survey to measure changes in moral reasoning. Most of the analysis will be simple statistics, with some qualitative analysis of open ended questions.

Professor Timothy F Chen
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For over two decades, my research team has focussed on improving health outcomes for consumers by optimising the use of medicines and reducing factors which contribute to medication-related harm. Medication management is a major area of research expertise and passion. I have enjoyed supervising over 35 Hons candidates over my career.

Academic Profile http://sydney.edu.au/pharmacy/about/people/profiles/timothy.chen.php

Project: Medication regimen complexity and adherence to prescribed medicines in pre-dialysis patients

Co-Supervisor: Dr Ronald Castelino

Project Summary: The purpose of this study is to evaluate the impact of medication regimen complexity on medication adherence in pre-dialysis patients [defined as stage 4; estimated glomerular filtration rate (eGFR) between 15-29ml/min/1.73m^2 and stage 5; eGFR (<15ml/min/1.73m^2) chronic kidney disease]. Patients with chronic kidney disease (CKD) especially those approaching end-stage kidney disease (ESKD) often have multiple illnesses which require complex therapeutic regimens and therefore the need for more - vigilant monitoring. Furthermore, frequent changes in medication regimen eventually leads to an increased risk of medication-related adverse effects and non-adherence to the prescribed medications. This study will identify unique challenges faced by pre-dialysis patients especially the impact of complexity of medication regimens in adhering to their medications. A prospective, cross-sectional, descriptive study design will be used. We will be conducting observations, surveys and patient interviews with a special focus on medication use amongst pre-dialysis patients.

The objectives are to:

1. evaluate regimen complexity using the medication regimen complexity index (MRCI)
2. evaluate the impact of regimen complexity on therapy adherence in pre-dialysis patients

The working hypotheses include:

1. Regimen complexity is associated with lower adherence to therapy
2. Therapy adherence is associated with (perceived) burden of medication administration

Methods

Design: Prospective, cross-sectional, descriptive study design.

Setting: Patients referred to pre-dialysis services attending treatment options education day at Blacktown Hospital between June 2019 and December 2019 (6 months)

Participants:

Inclusion criteria:

- All adult patients (≥ 18 years old) with stage 4-5 CKD (pre-dialysis) attending the treatment options education day at the regional dialysis centre (RDC), Blacktown.

Exclusion criteria:

- Patients diagnosed with cognitive impairment or major psychiatric disorders.
- Non-English-speaking patients

References:

Ghimire, S., **Castelino**, **R.**, Jose, M., Zaidi, S. (2017). Medication adherence perspectives in haemodialysis patients: a qualitative study. *BMC Nephrology*, 18(1), 1-9.

Ghimire, S., Peterson, G., **Castelino**, **R.**, Jose, M., Zaidi, S. (2016). Medication Regimen Complexity and Adherence in Haemodialysis Patients: An Exploratory Study. *American Journal of Nephrology*, 43(5), 318-324.

Dr Janet Cheung
janet.cheung@sydney.edu.au

Dr Cheung is a registered pharmacist with a broad research interest in empowering patients to actively participate in their own health care. Her expertise in sleep research spans across the quality use of sleep medications, shared decision-making and primary care health services.

Academic Profile http://sydney.edu.au/pharmacy/about/people/profiles/janet.cheung.php

Research Group Group members include 1 Honours student and a multidisciplinary sleep research group at the Woolcock Institute of Medical Research

Project 1: Patient perceptions of medication related risk: How much is really at stake?

Co-Supervisors: A/Prof. Bandana Saini, Prof. Jason Ellis (Northumbria Centre for Sleep Research, Northumbria University, UK)

Project Summary: Common medications used to promote sleep (e.g. benzodiazepines) can lead to impaired alertness. Within the scope of pharmacy practice there are standard counselling and medication labelling requirements to help patients minimise and manage medication related risk (MRR). Despite these measures, patients often take medications at inappropriate times and/or continue tasks with high attentional demands (e.g. driving) - a phenomenon known as the risk-perception gap. The current honours project explores patient perceptions of MRR, specifically it will uncover the decisional pathways that patients undertake when appraising the context of medication use and formulating a behavioural response (i.e. the use/non-use of medication). A better understanding of how patients make sense of MRR can potentially inform the development of more effective risk communication resources/strategies and is likely to have important practice implications given the high prevalence of insomnia presenting to community pharmacy.

Methods: Qualitative project, conducting a series of semi-structured interviews followed by thematic analysis using a Grounded Theory approach.

Project 2: Are you clear? Complementary medicines through the eyes of the consumer

Co-Supervisor: A/Prof. Lorraine Smith

Project Summary: An estimated 52% of Australian consumers will take a complementary medicine product (CMP) such as an herbal medicine or nutritional supplement in a 12 month period. The heterogeneous formulations and doses available for CMPs with the 'same' ingredients can be problematic for consumers when they self-select products. Often, the package labelling is the only source of information that the consumer can use to determine product suitability and to ultimately make a purchase. While considerable research has been invested towards optimising the labelling for prescribed and over-the-counter medications, less is known about the readability and usefulness of current CMP labels in guiding consumer decision-making. Therefore, the aim of this honours project is to explore consumer perceptions and experiences of product labelling for CMPs and to understand their information processing pathways when reading a product label. The results of this study will be used to inform further developments in consumer friendly labelling of CMPs, which will contribute to the appropriate and safe use of these products.

Methods: Qualitative interviews (protocol analysis) and content analysis.

References:

1. Jomaa, I., Odisho, M., M.Y. Cheung, J., Wong, K., Ellis, J., Smyth, T., Saini, B. (2018). Pharmacists' perceptions and communication of risk for alertness impairing medications. *Research in Social and Administrative Pharmacy*, 14(1), 31-45.
2. Cheung, J., Bartlett, D., Armour, C., Ellis, J., Saini, B. (2016). People with insomnia: Experiences with sedative hypnotics and risk perception. *Health Expectations*, 19(4), 935-947.

Dr W. Bret Church
bret.church@sydney.edu.au

Interests are the design and optimisation of compounds in drug discovery using protein structural information. We can see how ligands and drugs bind. The ability to understand the manner in which a receptor performs it function using its three-dimensional structure has advanced rapidly in recent years, often due to the recent advances enabling work on membrane bound receptors.

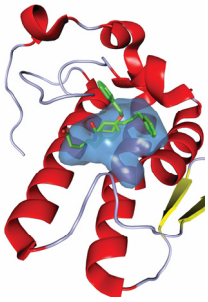
Academic Profile http://sydney.edu.au/pharmacy/about/people/profiles/bret.church.php

Research Group 3 Postgrad students, one visiting Scientist

Project: Human secretory phospholipase A_2 as a target in cancer

Co-Supervisor: Dr Karine Bastard

Project Summary: We are working with inhibitors of this small phospholipase A_2 (M_W = 14 kDa, GIIA) which is a target in cancer and inflammation. We, with collaborators, have not yet fully determined the mechanism of action of a pentapeptide inhibitor which has progressed through animal trials. We have determined some structural aspects of selective inhibition of the catalysis and signaling aspects of the phospholipase. The active site of the protein is shown in blue. Around the opening to the active site in this view are the contributing components of the interfacial binding site. This project requires an analysis of the activity of this and related enzymes, involving careful active site analysis.



Methods: This project will involve use of software to perform the analysis, receptor construction and docking, as well software for the presentation of the results.

References:
Bastard et al (2017) Nature Chem Biol 13, 858-866
Lee, L.K. et al (2013). Journal of Biol Chem, 288, 15269-15279
Kim, R.R et al (2017) Proteins, 85, 827-842

Professor Mary Collins (Chebib)
mary.collins@sydney.edu.au
Location: Brain and Mind Centre

My research passion is to understand how drugs act at ion channels, in particular P2X7, glycine, $GABA_A$ and nicotinic receptors. We are currently focussing on novel synthetic inhibitors of P2X7, neurosteroids, cannabinoids from medicinal marijana and non-benzodiazepines for epilepsy, pain, anxiety and stroke. We are laboratory based and focus on the molecular pharmacology and animal models of disease to answer our research questions.

Academic Profile http://sydney.edu.au/pharmacy/about/people/profiles/mary.collins.php

Research Group Dr Nathan Absalom, Dr Petra van Nieuwenhuijzen; Grant Richter and Morgane Mazzarino: Ion channel drug discovery

Project 1: Effects of P2X7 ligands in stroke recovery

Co-Supervisors: Dr Petra van Nieuwenhuijzen and Grant Richter
Project Summary: Stroke is the leading cause of severe long-term disability with speech, memory and motor movement significantly affected. No drug therapy is currently available to improve recovery in patients. Thus, there is an urgent need for therapies that can promote recovery after stroke. This project will determine P2X7 ligands and could potentially improve motor function in animal models of stoke, and ultimately stroke patients.

Methods: Photothrombotic mouse model of stroke, immunohistochemistry, animal behaviour

Project 2: Assessing effect of epilepsy causing GABAA mutations in drug treatment: A functional genomic approach

Co-Supervisor: Dr Nathan Absalom
Project Summary: In collaboration with Neurologists at Westmead, we are assessing the effect of GABAA receptor mutations identified in children who are refractive to current anti-epileptic treatements. The project will functionally assess how mutations in GABAA receptors cause epilepsy and using these mutated receptors determine what GABAergic drugs could be used to treat epilepsy for a particular patient. This is the forefront of precision medicine.

Methods: Molecular biology, electrophysiology specifically two-electrode voltage clamp

References:

1. Clarkson AN, Boothman-Burrell L, Dósa Z, Nagaraja RY, Jin L, Parker K, van Nieuwenhuijzen PS, Neumann S, Gowing EK, Gavande N, Ahring PK, Holm MM, Hanrahan JR, Nicolazzo JA, Jensen K, **Chebib M.** (2018) The flavonoid, 2'-methoxy-6-methylflavone, affords neuroprotection following focal cerebral ischaemia. J Cereb Blood Flow Metab. 1:271678X18755628. doi: 10.1177/0271678X18755628. [Epub ahead of print]
2. Bakas T, van Nieuwenhuijzen PS, Devenish SO, McGregor IS, Arnold JC, **Chebib M.** (2017) The direct actions of cannabidiol and 2-arachidonoyl glycerol at $GABA_A$ receptors.

Dr Hien Duong
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Our research is multidisciplinary which focuses on the new concepts and ideas to engineer novel materials and devices at nanoscale. The ultimate goal is to utilize the nanotechnology in the form of nanoparticles to extend our life in two ways: i) early detection of life-threatening diseases and ii) improvement of their current therapy. Our research area includes polymer synthesis, fabrication and characterization of organic, inorganic and biocompatible nanomaterials for biomedical applications. We have extensive experience in understanding the interface between polymer synthesis and biomedical science.

Academic Profile http://sydney.edu.au/pharmacy/about/people/profiles/hien.duong.php

Project 1: Multimodal nanoparticles to overcome antibiotic resistance

Co-Supervisor: Dr Philip Kwok
Project Summary: The rise of hospital-acquired infections, also known as nosocomial infections, is a growing concern in intensive healthcare, causing the death of hundreds of thousands of patients and costing billions of dollars worldwide every year. In addition, a decrease in the effectiveness of antibiotics caused by the emergence of drug resistance in pathogens living in biofilm communities poses a significant threat to our health system. We aim to develop a novel nanostructure-based formulation technology which can overcome antibiotic resistance and facilitate the wound healing in chronic infection. The novelty of this nanotechnology lies in the delivery of triple hits (bacteriophages, antibiotics and nitric oxide) to biofilm-related chronic infection. This formulation is expected to be much more effective than the conventional single-entity treatment. The ultimate goal is to develop an inhaled nano-in-microparticle formulation for lung infection treatment.

Methods: Nanoparticles synthesis and characterization, advanced polymerization technique, microscopy techniques, cell culture.

Project 2: New 3-in-1 formulation for prostate cancer treatment

Co-Supervisor: Dr Philip Kwok
Project Summary: Prostate cancer is the most common cancer and the second most common cause of cancer deaths in Australian men. More than 10% of men will develop prostate cancer during their lifetime.1 Despite potentially curative therapy by surgery or radiation, there has been a 72% increase in metastatic prostate cancer between 2007 and 2013. Whilst this cancer responds to androgen deprivation therapy for around 18 months, castrate resistant disease, for which there are no curative treatments, is inevitable. Therefore, novel diagnosis and treatment strategies for this disease are urgently required. Nanotechnology in the form of nanoparticles offers exciting possibilities for detecting prostate cancer early and in offering therapeutic options when hormones have failed.
In this project, we aim to build a nanostructure-based formulation for the management of prostate cancer. The novelty of this nanotechnology lies in the delivery of a light-driven triple hit to the prostate cancer cells which will be much more effective than conventional single-entity treatments.

Methods: Nanoparticles synthesis and characterization, advanced polymerization technique, cell culture.

References:
Nguyen, T.K., Selvanayagam, R., Barraud, N., Duong, H.T.T., Boyer, C. "Co-Delivery of Nitric Oxide and Antibiotic using Polymeric Nanoparticles", 2016, Chemical Science, 2016, 7, 1016-1027
Duong, HTT Duong, Chen, Y., Tawfik, SA. Wen, S., Parviz, M., Shimoni, O., D Jin "Systematic investigation of functional ligands for colloidal stable upconversion nanoparticles", 2016, RSC Advances 8 (9), 4842-4849.

Dr Sarira El-Den
sarira.el-den@sydney.edu.au

I am a registered pharmacist and Lecturer at the School of Pharmacy. My main research areas are pharmacy education, mental health and psychometric testing of measurement instruments. I have a Master in International Public Health, a PhD in Pharmacy Practice and am a certified Blended, Tertiary and Standard Mental Health First Aid instructor.

Academic Profile http://sydney.edu.au/pharmacy/about/people/profiles/sarira.el-den.php

Research Group Currently co-supervising two Honours projects in 2018

Project: Mental Health First Aid in healthcare curricula

Co-Supervisors: Dr Claire O'Reilly, A/Prof. Rebekah Moles

Project Summary: This project focuses on exploring the evidence relating to the implementation and evaluation of Mental Health First Aid (MHFA) training. The Australian Government currently provides funding for health, allied health and human services tertiary students to complete Tertiary-MHFA training, until June 2019. In Semester 1, the Research Team will conduct a systematic review to identify any national and international publications relating to MHFA assessment and evaluation. The main aim of this review will be to identify how MHFA participants have been assessed on their knowledge and skills post-training. The project team has expertise in conducting systematic reviews of this nature.

In Semester 2, data will be collected from every pharmacy, nursing and medical programme across Australia to quantify the number of programmes that have embedded MHFA into their curricula. We will also collect data on the type of MHFA training being delivered, the nature of training (compulsory/optional), the number of students certified each year, the tertiary level (year 1, 2, postgrad, etc) of students and the type of assessment and evaluation post-training. It is likely that data collection will involve structured, audio-recorded telephone interviews with stakeholders from pharmacy, nursing and medical curricula Australia-wide. The research team is currently working on cross-country comparisons of MHFA implementation and evaluation and there is an opportunity to expand the project.

Methods: Systematic review, guided by PRISMA Checklist.
Audio-recorded telephone or face-to-face interviews to collect quantitative and qualitative data.
Thematic analysis of qualitative data.

References:

1. El-Den, S., Chen, T. F., Moles, R. J., & O'Reilly, C. L. (2018). Assessing Mental Health First Aid Skills Using Simulated Patients. *AJPE, 82*(2), Article 6222.
2. El-Den, S., Chen, T. F., Gan, Y. L., Wong, E., & O'Reilly, C. L. (2018). The psychometric properties of depression screening tools in primary healthcare settings: A systematic review. *J Affect Disord, 225*, 503-522. doi:10.1016/j.jad.2017.08.060
3. El-Den, S., O'Reilly, C. L., & Chen, T. F. (2015). A systematic review on the acceptability of perinatal depression screening. *J Affect Disord, 188*, 284-303.

Dr Ingrid Gelissen
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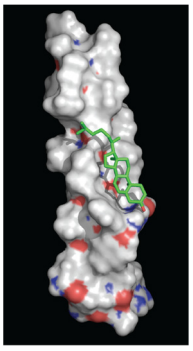
My research passion is in the area of ABC transporters, which are export pump involved in the removal of many drugs but also lipids from cells. These transporters are important in the development of multiple disease states, ranging from atherosclerosis, Alzheimer's disease as well as multi-drug resistance to name a few.

Academic Profile http://sydney.edu.au/pharmacy/about/people/profiles/ingrid.gelissen.php

Project 1: Investigating the post-translational control of ABC lipid transporters via E3-ligases

Co-Supervisor: TBA

Project Summary: ABC lipid transporters are involved in the removal of excess cholesterol and other sterols from cells in many tissues, including macrophages in the arterial wall, lung epithelial cells and brain cells to name a few. Lipids like cholesterol can interact with the transmembrane regions of these transporters (see Figure from Sharpe et al 2015). We have previously published (see Aleidi et al 2015) that several ABC lipid transporters are under the control of E3-ligases, which are proteins that can "tag" the ABC's with ubiquitin molecules. Addition of ubiquitin molecules can send the ABC transporters off for degradation or change their cellular localisation; hence this is an important regulatory control point in the cell. This project will continue this work by exploring co-factors that might be involved in this mechanism.



Methods: Cell culture, SDS-Page, PCR

Project 2: Can we exploit the post-translational processing of ABCB1 (or P-gp) to prevent Alzheimer's disease?

Co-Supervisor: A/Prof. Richard Callaghan (Australian National University)

Project Summary: Alzheimer's disease (AD) is the most common form of dementia, accounting for up to 70% of dementia cases. There is currently no cure for AD, and drugs are aimed at symptom alleviation. Although the cause of AD is unknown, a critical factor is the accumulation of amyloid amyloid-β (Aβ) peptides, which are toxic to neurons. Our project aims to study the control of the export pump ABCB1, also known as P-glycoprotein, which plays a critical role in the removal of these toxic peptides from brain cells. We hypothesise that ABCB1 is important in the removal of toxic Aβ peptides from neurons, in order to establish whether this removal pathway should be considered for future therapeutic targeting to prevent AD development.

Methods: Cell culture, SDS-Page, PCR

References:

Aleidi SM, Howe V, Sharpe LJ, Yang A, Rao G, Brown AJ and Gelissen IC. *J. Biol. Chem.* 2015; 290:24604-13
Sharpe LJ, Rao G, Jones PM, Glancey E, Aleidi SM, George AM, Brown AJ and Gelissen IC. *Biochim. Biophys. Acta.* 2015; 1851:956-64

Dr Danijela Gnjidic
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Our research is primarily focused on informing the Quality Use of Medicines in older adults. We conduct studies in clinical and geriatric pharmacology, clinical studies on polypharmacy and deprescribing (drug withdrawal) in older people with and without dementia, and large scale observational or pharmacoepidemiological studies.

Academic Profile http://sydney.edu.au/pharmacy/about/people/profiles/danijela.gnjidic.php

Research Group Group members include research officer, 1 MPhil student, 2 Honours student and multi-disciplinary research group at Royal North Shore Hospital and Concord Hospital

Project 1: Optimising pharmaceutical care for people with dementia in acute care settings

Co-Supervisors: Prof. Sarah Hilmer, Prof. Andrew McLachlan
Project Summary: Improving medical care for people with dementia in the acute care setting is a major public health need and of immense importance to consumers, community and stakeholders (1). People with dementia do not receive appropriate care in hospitals and are more likely to experience worse clinical outcomes compared to people without dementia. Importantly, evidence suggests that some hospital admissions and their complications are avoidable, with up to 30% of admissions among older adults attributed to inappropriate prescribing. However, the extent of medication-related hospital admissions among people with dementia is not well documented.

The project will be conducted as part of a large multi-centre cohort study of older inpatients, to compare the prevalence of adverse drug reactions (ADRs) among inpatients admitted with and without dementia.

Methods: The project will involve a range of techniques including retrospective data collection from medical records, data entry, quantifying ADRs using various approaches, and data analysis. There may be an opportunity to contribute to a publication.

Project 2: Changes in opioid use among community-dwelling older Australian men: Concord Health and Ageing in Men Project (CHAMP)

Co-Supervisors: Prof. Fiona Blyth, Prof. Andrew McLachlan
Project Summary: Misuse and abuse of prescription opioids is a major international public health problem. In the last decade, numerous studies have documented overprescribing of opioids for chronic non-cancer pain in the US with similar trends reported in Australia and other countries. However, at present, the evidence on the patterns of opioid use in older adults is sparse. In older adults, opioids should be used with caution for pain relief due to the increased risk of adverse drug events (ADEs).

This project will involve examining changes in opioid use in community-dwelling older men. Data from the Concord Health and Ageing in Men Project (CHAMP), a cohort of 1705 men aged ≥70 years living in the community will be used. Participant information included sociodemographic characteristics, medical conditions, pain and medication inventory at baseline, 2 years, 5 years and 8 years will be analysed.

Methods: The project will involve a range of techniques including data entry, coding of medication data, and data analysis. There may be an opportunity to contribute to a publication.

References: **(1)** Alzheimers Australia 2014. Dementia Care in the Acute Hospital Setting: https://fightdementia.org.au/files/.../Alzheimers-Australia-Numbered-Publication-40.pdf. **(2)** Gnjidic D, Blyth FM, Le Couteur DG, Cumming RG, McLachlan AJ, et al. Non-steroidal anti-inflammatory drugs (NSAIDs) in older people: prescribing patterns according to pain prevalence and adherence to clinical guidelines. Pain 2014; 155:1814-20.

Professor Paul Groundwater
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The discovery of antibacterial agents acting on new prokaryotic targets and the development of new methods for the detection of pathogenic bacteria.

Academic Profile http://sydney.edu.au/pharmacy/about/people/profiles/paul.groundwater.php

Project: Enzyme substrates for the detection of the nosocomial pathogens MRSA and / or *E. faecalis*

Co-Supervisor: Prof. Dai Hibbs

Project Summary: Chromogenic media for bacterial detection,[1] are simple to use and, as is the case for ChromID™ *P. aeruginosa* (Figure 1),[2] can be sufficiently specific that no further testing is required. A limiting factor, however, in the use of these media is the time taken for the development of the indicative colour, which is typically 24-48 hours; during this time the patient may infect other patients, or may be treated with empirical antibacterial therapy (usually broad spectrum antibacterial agents), resulting in poorer outcomes and the possibility of the development of further resistance.

The aim of this project will be to develop a new rapid method for the detection of *MRSA* or *E. faecalis*, two of the top drug-resistant antibacterial threats to global healthcare, through the use of culture media containing a fluorescent probe. This work will build upon our recent discovery of a probe which is capable of distinguishing between MRSA (Figure 2; fluorescence) *S. epidermidis* (*Se*, no growth) and methicillin-sensitive S. aureus (MSSA) (Figure 2; *Sa*, growth inhibition); the probe also has potential in differentiating between *E. faecium* (*Efm*, no growth) and *E. faecalis* (*Efs*, fluorescence).

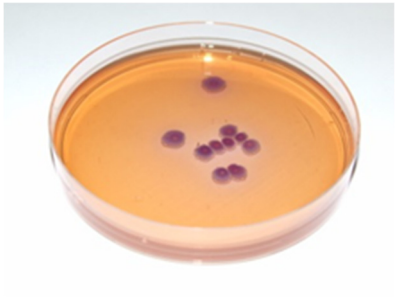

Figure 1

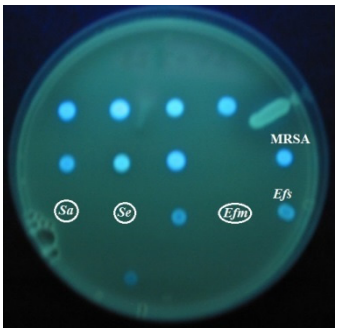

Figure 2

References:
[1] L Váradi, JL Luo, DE Hibbs, JD Perry, RJ Anderson, S Orenga, and PW Groundwater, *Chem. Soc. Rev.*, 2017, **46**, 4818-4832
[2] A Bedernjak, A Zaytsev, M Babolat, M Cellier, A James, S Orenga, JD Perry, PW Groundwater, and RJ Anderson, *J. Med. Chem.*, 2016, **59**, 4476-448.

Dr Joanna Harnett
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My key research areas relate to the quality, safety and efficacy of Complementary Medicines. I am passionate about conducting research that informs and guides an evidence-based approach to the use of complementary medicines.

Academic Profile http://sydney.edu.au/pharmacy/about/people/profiles/joanna.harnett.php

Research Group Joanna is actively involved with a number of complementary medicine research groups both nationally and internationally. She is currently principal supervisor to one Honours student and co-supervisor to one PhD and one Honours student.

Project 1: Resources to support effective interprofessional communication

Co-Supervisor: A/Prof. Jennifer Hunter (Sydney Medical School, Menzies Centre for Health Policy; NICM Health Research Institute, Western Sydney University)

Project Summary: Over a twelve-month period up to half of all Australians will consult allied health, complementary medicine and/or medical practitioners. Failures in communication between health care practitioners (HCPs), administration, patients and families are a leading cause of sentinel events. Such failures may inappropriately leave patients with the responsibility of accurately communicating between their HCPs and coordinating their own multidisciplinary care. Conversely, effective interprofessional communication (IPC) and collaboration promotes greater professional job satisfaction and patient satisfaction, as well as safer, more effective and efficient care. In 2018, The Australasian Integrative Medicine Association (AIMA) commissioned The University of Sydney to manage a public consultation on a draft 'Interprofessional communication – AIMA guiding principles for letter writing'.

Aim – The purpose of this study is to analyse, summarise and disseminate the feedback received about the draft 'Interprofessional communication – AIMA guiding principles for letter writing' and associated resources.

Methods – A narrative review of the literature, mixed method analysis of the quantitative and qualitative data from the public consultation feedback survey and questionnaire results from HCP educational events will be conducted.

Project 2: The quality of valerian products available in Australian pharmacy – from the label to laboratory

Co-Supervisor: A/Prof. Bandana Saini

Project Summary: Sleep disorders including insomnia, obstructive sleep apnea and restless legs syndrome are prevalent throughout the modern world. Despite the substantial impact of untreated sleep disorders, many individuals do not engage with conventional health care systems to seek treatment for a number of reasons including a preference for alternative treatments, dissatisfaction with conventional treatment and arguably, effective complementary medicine product (CMP) marketing strategies. Australian pharmacy supply over 50% of the CMPs including herbal products that are commonly used for sleep disorders. *Valeriana officinalis,* commonly known as Valerian, is a popular herbal CMP that is that is promoted for 'relieving disturbed sleep patterns'.

Aim – To synthesise the available evidence for the efficacy and quality standards of valerian products and conduct a quality assurance assessment of the products sold in Australian Pharmacy.

Methods: Students will be required to conduct a systematic review of the literature, assess CM Product information and conduct a thin layer chromatography analysis of selected valerian products.

References:

ABS. *Australian Health Survey 2011-12: Table 2 Type of health professional consulted.* 2013. The Joint Commission's Summary of Sentinel Events 2004-2015. *Joint Commission Perspectives,* April 2016.

Professor Dai Hibbs
david.hibbs@sydney.edu.au

- Molecular Modelling and Computational Chemistry
- Biological and Medicinal Chemistry
- Drug Design
- Solid state chemistry
- High resolution X-ray and neutron diffraction
- Experimental charge density distributions. ab initio and DFT calculations

Academic Profile http://sydney.edu.au/pharmacy/about/people/profiles/david.hibbs.php

Project 1: High resolution X-ray crystallography: Pharmaceutical co-crystals by design

Co-Supervisors: Prof. Paul Groundwater

Project Summary: Over the last decade, the importance of the design and characterisation of pharmaceutical co-crystals has become an area of primary interest to both industry and academia.[1] Co-crystals incorporate pharmaceutically acceptable guest molecules into a crystal lattice along with the Active Pharmaceutical Ingredient (API). Physiochemical properties such as poor dissolution rate, solubility, chemical stability and moisture uptake influence the therapeutic efficacy of many pharmaceuticals, and significantly lower the market value of a drug. Multi-component crystals e.g. solvates, hydrates, co-crystals, and salts have an important role in the design of new formulations that address these issues particularly in the pharmaceutical area. Using high-resolution X-ray crystallography and molecular modelling, this project aims to identify new co-crystal coformers, and the mechanisms by which these co-crystals form. Each stream embodies a substantial research program exploring both the structural and electronic basis used by Nature in the construction of assemblies that are fundamental to crystal formation, enzyme catalysis and drug-receptor binding. Possible combinations for study are given below in table 1.

API1	API2	Indication
Clopidogrel	Aspirin	Anticoagulant
Risedronate	Calcium	Osteoporosis
Fluticasone	Salmeterol	Asthma
Ibuprofen	Esomeprazole	Pain/GERD

Methods: X-ray Crystallography, Molecular modelling, *ab initio* calculations, chemical synthesis

Project 2: Design and synthesis of small molecules for NDM-1 inhibition

Co-Supervisors: Prof. Paul Groundwater, Prof. John Perry (UK)

Project Summary: New Delhi metallo-β-lactamase (NDM-1) is an addition to the antibiotic resistance weaponry of Enterobacteriaceae. It has been found to confer resistance to most β-lactam antibiotics, including carbapenems. Since its discovery in 2008, NDM-1 producing bacteria have disseminated globally, facilitated predominantly by gut colonisation and the conjugation of plasmids carrying the *bla*$_{NDM-1}$ gene. NDM-1 producers are involved in infections in both hospital and community settings and have also been isolated from water sources in India. With few effective antibiotics against NDM-1 producers, and resistance developing to those remaining, there has been a push to develop new treatments effective against NDM-1 producers. The rapid spread of broad spectrum antibiotic resistance conferred by NDM-1 makes it a very real threat to current antimicrobial approaches. This calls for the prioritisation of drug design attempts to find effective antibiotics against NDM-1. The development of increasingly sophisticated virtual compound library screening techniques in recent years may hold great potential in the search for NDM-1 inhibitors. Coupled with high resolution NDM-1 crystal structures, these approaches are able to rapidly and accurately assess binding interactions between NDM-1 and extensive libraries of chemical compounds; thus enabling the identification of better inhibitors.

Dr Lifeng Kang
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Dr Kang's research is in the field of the microscale technologies and its applications in drug delivery and tissue engineering. In drug delivery, microstructures can be engineered as carriers to deliver drugs with temporal and spatial control. In tissue engineering, microscale technologies can be used to fabricate biomimetic scaffolds with increased complexity and vascularization to control the cellular microenvironment.

Academic Profile http://kanglab.net

Research Group Currently one M.Phil. student and one Honours student

Project 1: Dietary fibre and its health benefits

Co-Supervisors: Dr Jaspreet Kochhar and Dr Yan Li (P&G Singapore)
Project Summary: Dietary fibre is intrinsic in fibre-rich foods. Dietary fibres have many beneficial effects on human health, if consumed at recommended levels (25 g/d for adult women, 38 g/d for adult men). Most (90%) of the US population consume only 15 g/d, well below the needed amounts. To bridge this gap, many consumers use fibre supplements. Of the fibre supplements on the market today, only a small portion has suitable properties that can impart clinically meaningful health benefits.
Young adults have been identified as key target for point of market entry (POME)/ point of market change (POMC) for healthcare category. This age group is receptive to new products and hence research among them is critical. This project is to study the use of dietary fibres in young adult consumers.
The objectives of the current project are:

- To archive and analyse the major active ingredients inside diary fibre supplements.
- To understanding key product features and the drivers / barriers behind that usage.

Methods: Literature search and questionnaire

Project 2: A 3D printed human lung model for microparticle characterisation and optimisation

Co-Supervisor: Dr Philip Kwok
Project Summary: Pulmonary route is the main route of drug delivery for asthmatic and chronic obstructive pulmonary disease patients and offers several advantages over the oral route. Determining the amount of drug deposited onto various parts of our respiratory tract allows for a good correlation to clinical efficacy of inhalation drug devices. However, current impactors measure only the aerodynamic particle size distribution, which does not truly represent the in vivo deposition pattern in human respiratory tract and provides no accurate *in vivo* predictions. To establish the in vitro model, the major challenge is the complex structure of the tracheobronchial tree. To address this challenge, Three-Dimensional Printing (3DP) can be used. 3DP is a relatively new technology that uses computer-aided drafting technology to produce a 3D object by layering material onto a substrate. 3DP can accommodate many geometrical outlines and can be made from varying materials. In this project, we aim to build a human airway model by using 3DP. With this model, particulate drug delivery systems will be tested *in vitro* and compared with published *in vivo* data.

Methods: To use a 3D printer to fabricate a model using elastomers to replicate an adult lung with complex anatomical structures and suitable elasticity for drug deposition testing.

Associate Professor Veysel Kayser
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Areas of interest:

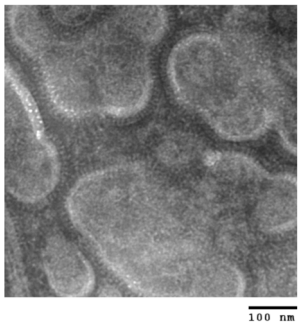
- Biologics and vaccines
- Biosimilars and next generation biotherapeutics
- Vaccine and biopharmaceutical manufacturing
- Stabilization and formulation of biotherapeutics and vaccines
- Protein folding and aggregation
- Molecular level design of biologicals and processes

Academic Profile http://sydney.edu.au/pharmacy/about/people/profiles/veysel.kayser.php

Research Group We have 4 postgrad students (PhD) and 1 Honours student and are part of the Cancer research Network and Marie Bashir Institute for Infectious Diseases and Biosecurity.

Project 1: Universal flu vaccine

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

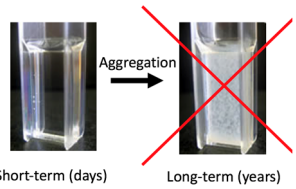


Project Summary: Influenza has a special place amongst infectious diseases because it is a moving target due to its extensive viral drift and shift; hence requiring annual vaccination. Even with available vaccination, morbidity and mortality rates of seasonal influenza are still extremely high, causing more than 500,000 deaths and millions of hospitalisations worldwide and ~13,000 hospitalisations and 3,500 deaths in Australia on an annual base. Effectiveness of flu vaccines usually varies between 30-65%, but in some recent seasons it dropped to 10%. Therefore, a fundamentally new approach to prepare flu vaccines is of utmost importance. **In this project,** a novel approach to prepare flu vaccine will be tested. It will involve preparation of a flu vaccine comprising of up to 10 different flu strains in a single vaccine. Accelerated studies will be conducted to ensure that vaccine formulation is stable.

Methods: We will mainly use UV-Vis and fluorescence spectroscopy methods in this Honours project.

Project 2: Formulation stability of therapeutic monoclonal antibodies

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



Project Summary: In recent years, protein aggregation became a research focus in the biotech industry because recombinant proteins tend to degrade mainly by aggregation. In this project, we will investigate aggregation of therapeutic monoclonal antibodies using several spectroscopic techniques. The focus will be studying and characterization of the earliest stages of protein aggregation due to their fundamental importance. External dye-binding method using a hydrophobic dye will be utilized to probe molecular interactions. The dye binds preferentially to non-polar environments and does not fluoresce well in an aqueous environment. However, when it is bound to protein aggregates, its fluorescence increases considerably.

Methods: We will mainly use UV-Vis and fluorescence spectroscopy methods in this Honours project.

References: (1) Kayser *et al.*, Biotechnol J, 2012, 7(1):127-32. (2) Lee *et al.*, Hum Vaccin Immunother, 2016, 12(7):1757-65

Dr Philip Kwok
philip.kwok@sydney.edu.au

My research interests include:

- Respiratory drug delivery
- Particle engineering
- Physicochemical characterisation of powders
- Pharmaceutical nanotechnology
- Electrostatics of aerosols for inhalation

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Research Group Honours student

Project: Aerosol performance of pharmaceutical combination inhalers

Co-Supervisors: Prof Hak-Kim Chan, Dr Patricia Tang, Dr Sussan Ghassabian

Project Summary: Asthma is an inflammatory airway disease. Inhaled corticosteroids (e.g fluticasone propionate, budesonide) and long-acting beta agonists (e.g. salmeterol xinafoate, formoterol fumarate dihydrate) are popularly used to treat the inflammation and airway constriction. Combination inhaler products containing these two types of drugs in fixed doses are available on the market. Due to patent protection, various companies have produced their own unique combinations. These products are formulated as metered dose inhalers or dry powder inhalers.

With the expiry of the patents of the original branded combination inhalers in recent years, many generic products have been marketed, especially in India. However, those generic products are not necessarily bioequivalent as it is relatively easy for generic products to be registered in India. Therefore, the delivered doses and aerodynamic particle sizes may differ between the products. This would have different therapeutic outcomes because those two parameters will affect the dose deposited in the lungs. There is yet no published data comparing between the original and generic inhalers. Thus it is worth to compare them to check how different (or how similar) their aerosol performance is. The findings derived are potentially useful for improving regulatory policies for generic combination inhalers.

The specific objectives of the project are to:

1. Test the *in vitro* delivered doses from the original and generic combination inhalers; and
2. Test the *in vitro* aerodynamic size of the particles from the original and generic combination inhalers.

The delivered dose and aerodynamic particle size will be measured by dispersing the aerosols into a unit dose collector and a cascade impactor, respectively. The drug deposits will then be chemically assayed by high pressure liquid chromatography. The experimental procedures follow those specified in the British Pharmacopoeia (1).

Methods: Cascade impaction, high pressure liquid chromatography

Reference: British Pharmacopoeia (2017) London: Stationary Office.

Professor Andrew McLachlan
andrew.mclachlan@sydney.edu.au

Our research is primarily focused on the Quality Use of Medicines. Research involves all aspects of pharmacy and pharmaceutical sciences including pharmacokinetics and clinical pharmacology with a focus on drug interactions and the application of evidence in practice.

Academic Profile http://sydney.edu.au/pharmacy/about/people/profiles/andrew.mclachlan.php

Research Group This is a collaborative project conducted with pharmacy leaders from the community (Rob King), the hospital (Mark Sheppard) and Dr Mark Naunton (University of Canberra)

Project: Investigating the impact of temperature excursions on medicines storage and stability

Co-Supervisors: Robert King, Mark Sheppard (RPAH), Mark Naunton and Sam Kosari (UC)
Project Summary: The appropriate storage of medicines, including temperature control, is a critical aspects of medication safety, inventory management and timely access to medicines. Biological medicines (including peptide hormones) and vaccines require stringent storage conditions with careful control over temperature with careful monitoring. When storage conditions change to due a power failure or equipment malfunction the temperature my increase or decrease for a period of time, this is often referred to as a temperature excursion.

Temperature excursions may or may not have a significant on product stability. This has the potential to be very expensive with medicines having to be discarded or destroyed for safety reasons with the related impact on availability of medicines.

The available data on medicines stability and storage requirement comes from a range or sources – this includes manufacturer's product information, regulatory documents (TGA), a limited range of guidance documents and the published scientific literature.

There is a need for a comprehensive source of searchable information to guide pharmacists on how to deal with products that have undergone a temperature excursions (1).

The project will focus on investigating the available evidence related to stability of medicine products that have been the subject of a temperature excursion to better guide the safe and appropriate storage of medicines. This will also investigate how pharmacists manage temperature excisions and aim to provide specific guidance that is useful for pharmacists and patients regarding the safe storage of medicines.

References: Kosari S, Walker EJ, Anderson C, Peterson GM, Naunton M, Castillo Martinez E, Garg S, Thomas J. Power outages and refrigerated medicines: The need for better guidelines, awareness and planning. J Clin Pharm Ther. 2018 Jun 13. doi: 10.1111/jcpt.12716.

Dr Barbara Mintzes
barbara.mintzes@sydney.edu.au
Location: Room 6W75, 6th Floor, The Hub, Charles Perkins Centre

The main focus of my research is on pharmaceutical policy, including how the policy environment affects the quality, effectiveness and safety of medicine use and ultimately patients' health. This includes examining the role of commercial influences on medicine use. I also carry out systematic reviews of outcomes of drug treatments, including both benefits and harm.

Academic Profiles http://sydney.edu.au/pharmacy/about/people/profiles/barbara.mintzes.php
http://sydney.edu.au/charles-perkins-centre/our-research/research-groups/evidence-policy-and-influence-collaborative.html

Research Group 1 post-doctoral, 1 PhD, 1 MPhil student, 1 research assistant; linked to team at EPIC, led by Prof. Lisa Bero

Project 1: Regulatory safety warnings on cardiovascular risks in Australia, Canada, US & UK: 2007-2016

Co-Supervisor: Dr Alice Fabbri
Project Summary: When a medicine first comes to market, there is limited knowledge of rare or longer-term serious adverse events. When new evidence of harm arises, regulators frequently issue warnings to health professionals and the public with the aim of guiding safer prescribing. This honours project is linked to a larger NHMRC-funded research project comparing safety advisories on medicines in Australia, Canada, the US and UK over a decade (n=1442 advisories). Cardiovascular adverse events were the most frequent type of safety issue identified. This honours project complements the larger project, enabling additional analysis and exploration of one of the findings. It includes an examination of the types of cardiovascular adverse events, drugs or drug classes, patient populations, evidence cited and advice provided in this set of warnings. The aim is to better characterise these safety warnings and to compare included countries. Within this project, the student will also be introduced to a larger international team of researchers. The literature review will focus on research on the frequency and characteristics of medication-related serious cardiovascular adverse events.

Methods: data entry, coding (including use of a coding system such as MedDRA) and analysis using the programs RedCAP, excel, and a data analysis program such as SPSS or R.

Project 2: How often do industry-funded health consumer organisations provide submissions to the Pharmaceutical Benefits Advisory Committee (PBAC) in support of sponsors' medicines.

Co-Supervisor: Dr Alice Fabbri
Project Summary: Since 2013, Medicines Australia (MA), the national association of the research-based pharmaceutical industry, has made public all company payments to health consumer organisations. Health consumer organisations (also called 'patient groups') are an important source of support, information and advocacy on behalf of patients with a specific condition. However, there is a concern about a conflict of interest introduced by pharmaceutical industry funding. We have analysed the MA reports and created a descriptive overview of which groups are funded, funding amount, disease area, and funding purpose, over a 4-year period. [article under review] A second analysis examined how transparent consumer organisations are about this funding and the extent to which they have policies governing sponsorship.[1] The current proposal examines the role of health consumer organisations in submissions to the Pharmaceutical Benefits Advisory Committee when a new medicine is being considered for reimbursement, and how often these submissions support funding of sponsors' drugs, as compared with non-industry funded groups. The literature review will examine the research evidence on the effects of public and industry input on drug reimbursement decisions.

Methods: content analysis, data coding, use of data analysis programs as above.

References: 1. Lau E, Fabbri A, Swandari S, Mintzes B. How do health consumer organisations in Australia manage pharmaceutical industry sponsorship? A cross sectional study. Australian Health Review 2018: https://doi.org/10.1071/AH17288

Dr Jennifer Ong
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- Pharmacy education
- Drug discovery
- Palliative medicine

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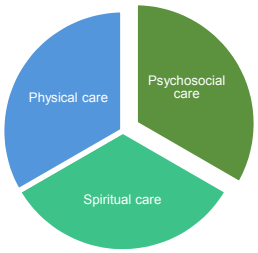
Research Group 1 Honours student

Project: Palliative sedation in New South Wales, Australia – Expert Opinions

Co-Supervisor: Prof. Jane Hanrahan

Project Summary: Palliative sedation, or sedation for refractory distress, aims to alleviate suffering through continuous administration of sedatives (including benzodiazepines, haloperidol, levomepromazine, phenobarbitone, and propofol) that renders a person to be unconscious in circumstances where distressing symptoms a refractory to all other treatments,[1,2] and is recognised by the national professional organisations and peak bodies including the Australian and New Zealand of Palliative Medicine recognises as part of good palliative care.[3] However, guidelines describing when a person's care should transition from symptom management to palliative sedation in Australia is lacking, hence best practices and expert opinions on the management of physical, psychosocial and spiritual distress in palliative settings will be investigated as part of this project, with the ultimate aim of contributing to the development of a tool to assist decision-making.



Methods: Literature review, semi-structured interviews, qualitative analysis

References:

1. Bozzaro C, Schildmann J. "Suffering" in Palliative Sedation: Conceptual Analysis and Implications for Decision Making in Clinical Practice. Journal of Pain and Symptom Management. 2018;56(2):288-94.
2. Last days of life: sedation for refractory distress. 2016. In: eTG Complete: Palliative Care, version 4 [Internet]. Melbourne, Victoria: Therapeutic Guidelines Limited. Available from: https://tgldcdp.tg.org.au/viewTopic?topicfile=terminal-care-in-last-days-of-life#toc_d1e931.
3. ANZSPM Position Statement on The Practice of Euthanasia & Assisted Suicide (updated 31 March 2017) The Australian & New Zealand Society of Palliative Medicine Inc [Internet]. Available from: http://www.anzspm.org.au/c/anzspm?a=sendfile&ft=p&fid=1491523669&sid=

Professor Asad (Sid) Patanwala
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Location: Royal Prince Alfred Hospital

My research interests are related to the comparative effectiveness and safety of medications in the acute care setting. Most of our studies pertain to the therapeutics of medications and their effect on patient outcomes.

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Research Group My research team includes clinicians at Royal Prince Alfred Hospital and internationally (United States)

Project 1: Immediate release oxycodone versus immediate release tapentadol in post-operative hospitalised patients

Co-Supervisor: Dr Jonathan Penm
Project Summary: Tapentadol is a semi-synthetic opioid indicated for moderate to severe pain. In addition to being a μ-opioid receptor agonist, it also inhibits the re-uptake of norepinephrine. It is possible that this dual mechanism of action is beneficial in post-operative patients because they often have a neuropathic component to their pain. In addition, there is the potential for decreased gastrointestinal adverse effects (e.g. constipation) and hospital length of stay compared to pure μ-opioid receptor agonists such as oxycodone.[1,2] In this project, students will collect data from electronic medical records at the Royal Prince Alfred Hospital. We will compare outcomes such as pain assessments, adverse effects, and hospital length of stay, between patients who receive immediate release tapentadol versus immediate release oxycodone post-operatively during hospitalisation. We will also evaluate the type of analgesics prescribed upon hospital discharge between groups and associated cost implications.

Methods: Medical record review, data coding and entry (REDCap), basic statistical analysis (e.g. STATA) and visualization

Project 2: Australian antidote use: evaluating adherence to guidelines and outcomes

Co-Supervisors: Jared Brown (NSWPIC), Dr Rose Cairns
Project Summary: This project will evaluate antidote utilisation and outcomes for three poisonings: digoxin, toxic alcohols, and methotrexate. This study aims to use medical records from the NSW Poisons Information Centre patients to evaluate use of these antidotes in Australia. This includes whether use is in accordance with expert recommendations and evidence based guidelines. These recommendations include: 1) use of reduced vials of digoxin specific Fab for digoxin poisoning[3], 2) use of folinic acid dosed 6 hourly until clinical improvement for methotrexate poisoning, 3) Use of fomeprizole instead of ethanol infusions for methanol and ethylene glycol poisoning. Outcomes will also be evaluated.

Methods: Medical record review, data coding and entry (REDCap), basic statistical analysis (e.g. STATA) and visualization

References: (1) Xiao JP, Li AL, Feng BM, Ye Y, Wang GJ. Efficacy and Safety of Tapentadol Immediate Release Assessment in Treatment of Moderate to Severe Pain: A Systematic Review and Meta-Analysis. *Pain Med*. 2017;1;18(1):14-24 (2) Lin J, Chow W, Kim MS, Rupnow MF. Real-world treatment pattern and outcomes among patients who took tapentadol IR or oxycodone IR. J Med Econ. 2013;16(5):685-90 (3) Chan BS, Isbister GK, O'Leary M, Chiew A, Buckley NA. Efficacy and effectiveness of anti-digoxin antibodies in chronic digoxin poisonings from the DORA study (ATOM-. 1). *Clinical Toxicology*. 2016;*54*(6), 488–494.

Dr Jonathan Penm
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My research interests centres around the quality use of medicines and medication safety in the hospital setting. I am interested in improving the use of high-risk medications (like antimicrobials, narcotics and anticoagulants). I am also interested in the use of technology to enhance hospital pharmacy services and medication safety.

Academic Profile http://sydney.edu.au/pharmacy/about/people/profiles/jonathan.penm.php

Project 1: Evaluating the impact of a text message reminder on the appropriate disposal of unused opioid medications after hospital discharge in NSW

Co-Supervisor: Prof Asad (Sid) Patanwala
Project Summary: This research aims to evaluate the impact of a text message reminder on the appropriate disposal of unused opioid medications after hospital discharge from multiple hospitals in NSW. Students may be required to conduct telephone interviews with discharged patients on their opioid use and analyse opioid prescribing patterns on discharge.

Background: Opioid medications are a mainstay of acute pain treatment and are commonly prescribed for post-operative or acute pain patients on discharge from hospital. However, significant proportions of these medications remain unused after the acute pain episode. A recent systematic review of the evidence around unused opioids after surgery found that 67% to 92% of patients reported unused opioids, and 42% to 71% of the opioid tablets went unused. This review also reported consistently low rates of appropriate disposal.

Methods: This project may involve a range of techniques including retrospective data collection from medical records, data entry, data analysis and training in interview techniques.

Project 2: Evaluating the impact of a guideline for discharge opioid prescriptions in a tertiary hospital in NSW

Co-Supervisor: Dr Danijela Gnjidic
Project Summary: This research aims to evaluate a guideline for discharge opioid prescriptions in a tertiary hospital in NSW. Students may be required to analyse opioid prescribing patterns, monitor the effects of opioids and interview healthcare professional and/or patients about the use of opioids.

Background: Over the last decade, Australians' use of opioids has quadrupled. Along with this increased use there has also been a corresponding and alarming increase in the harm from prescription opioids. Furthermore, within hospitals, opioids are consistently reported to adversely affect patients and are closely linked to serious medication safety incidents, including death. Although opioids are well recognised high-risk medications, few guidelines to ensure safe, appropriate opioid use exist in the Australian

Methods: This project may involve a range of techniques including retrospective data review, data entry, data analysis and training in interview techniques.

Dr Rebecca Roubin
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- Cancer biology
- Cell signalling
- Natural products
- Drug discovery and design
- Health professional education

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Research Group Naomi Sia, Rui Ng

Project 1: Novel nanoparticles for targeted delivery of anti-neoplastic agents to brain cancer cells

Co-Supervisor: Dr Pegah Varamini
Project Summary: There is an urgent need for identifying novel brain cancer drug therapy due to a lack of effective treatments for patient survival and improved quality of life by minimising side-effects. This project will focus on the synthesis, characterisation and evaluation of a range of new functionalised nanoparticles for the delivery of anti-neoplastic agents to brain cancer cells. In this project we are using a new mixed nano-micelle formulation that have been designed to effectively cross the blood-brain-barrier and encapsulate poorly-soluble anticancer drugs. Nanomicelles will be loaded with naturally occurring compounds, curcumin and ursolic acid that have been proved to have potential anticancer effects.

Methods: Nanoparticle formulation and characterization using DLS and HPLC, Cell culture techniques including antiproliferative activity (MTS) assay and live-cell imaging (IncuCyte).

Project 2: How is Competence Taught and Assessed in an integrated Pharmacy Curricula?

Co-Supervisors: Dr Betty Chaar, A/Prof. Rebekah Moles, Dr Irene Um
Project Summary: Competency-based pharmacy curricula is now the norm. Curricular integration is a core element of competency-based curricula which approaches the teaching of pharmacy from a more integrated perspective, rather than the previous discipline-based approach. The curricular integration approach combines pharmaceutical sciences with pharmacy practice; why? - to make the understanding of science applicable to practice. It is structured by themes and underpinned by a detailed set of learning outcomes, which describe the knowledge, skills and attitudinal milestones to be achieved each year and by the time of graduation, but is delivered in a variety of formats across pharmacy schools in Australia. The University of Sydney has recently adopted a new technique in teaching "curricula integration competence", by utilising smaller classes and a case-based approach that is innovative and engaging. However, no research has been conducted on student feedback on this technique or comparisons drawn with other methods of teaching.

It is of interest to explore the methods adopted, student feedback; as well as the assessments employed in various schools in order to ensure the curricula integration competence of all pharmacy graduates in Australia.

Aim: To explore students' and academics' perspectives on the teaching and assessment of competence in an integrated pharmacy curricula.

Methods: Mixed method approach will be adopted: simple quantitative [longitudinal, pre-post survey] and qualitative methods will be utilised to elicit students and academics' perspectives on integration. This will involve interviews with academics and focus groups conducted with students.

Associate Professor Bandana Saini
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Research Passion: Translating evidence for community pharmacy capacity in sleep and respiratory health care service into practice

Academic Profile http://sydney.edu.au/pharmacy/about/people/profiles/bandana.saini.php

Research Group I have a team of 6 PhD students all with a strong focus on developing professional pharmacy roles in sleep/respiratory health in Australia and internationally.

Project 1: What role can pharmacy play in caring for people with or at risk of macular degeneration?

Co-Supervisor: A/Prof. Bamini Gopinath (Westmead Institute; Kolling Institute. of Med Research; Royal North Shore Hospital)

Project Summary: Age-related macular degeneration (AMD) is the leading cause of blindness in older adults, and comprises a group of chronic, degenerative retinal eye diseases that cause progressive central vision loss. Given frequent contact with patients, especially older patients, community pharmacists can assist in risk reduction strategies (smoking cessation and lifestyle counselling), facilitate early detection, recommend dietary supplements where appropriate and ensure safe use of medication through improved labelling and counselling once there is vision loss. There is however no research on capacity within the community pharmacy sector for services for people with AMD. This novel study will explore how pharmacists currently serve the AMD population and what they perceive their future potential in this role is. The study will be a mixed methods study employing focus group discussions and simulated patient visits. Data obtained will help in developing and evaluating future pharmacy roles in prevention and treatment provision for AMD.

Methods: (Focus Group Discussions and Simulated Patients Methods).

Project 2: Primary care and sleep health: what is being done and what can be done

Co-Supervisors: Dr Janet Cheung, Dr Chris Gordon (Woolcock Institute of Med Research, School of Nursing and Midwifery)

Project Summary: Sleep disorders such as insomnia and obstructive sleep apnea are quite prevalent yet are under-recognised and either under or mis-treated. Primary care venues are a logical point where sleep disorders can be screened for, diagnosed, treated or referrals provided for specialised patient care. On the consumer landscape, wearable devices and digital technologies represent an ever-widening scope for self-care. As part of an NHMRC Centre for Research Excellence, this project aims to engage with primary care health professionals to explore current practice opportunities to improve sleep health as well as how health professionals envisage including digital health in their future span of practice. Primary health professionals this arm of the project will focus on will include community pharmacists, practice and community nurses.

Methods employed will be qualitative and will include focus group discussions or qualitative interviews that include simulated possibilities on consumer/health professional use of digital technology to address sleep health. This research will inform the development of sleep health care provision strategies within the primary care sector at professional and policy levels.

Methods: (Focus group discussions and semi structured interviews)

Dr Carl Schneider
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Current research interests involve optimising the Quality Use of Medicines. As the Australian population increases in age, there is a growing need to optimise the medications of older persons, particularly those with dementia. I am also interested in decision making and health education.

Academic Profile http://sydney.edu.au/pharmacy/about/people/profiles/carl.schneider.php

Research Group We currently supervise seven higher degree of research students and have a very collegial atmosphere up here on Level 5. The Faculty itself hosts arguably the largest group of Social Pharmacy researchers in the world.

Project 1: Development of a prioritisation algorithm for clinical pharmacy interventions in acute care

Co-Supervisors: Dr Jonathan Penm, Cristine Coorey (Clinical Lead, Westmead Hospital)
Project Summary: Medication misadventure is a common event. In Australia it has been estimated that there are 190,000 medicine related hospital admissions each year costing $660 million/year to the Australian health care system [1]. Once a patient reaches hospital they may also have a medication misadventure with up to 20% of medication administration events resulting in error (Runciman et al., 2003). The Westmead Hospital pharmacy department provides medication management service. Approximately two-thirds of pharmacist interventions are followed up by a prescriber. The aim of this project is develop a feasible and acceptable clinical intervention prioritization algorithm to optimize prescriber follow-up.

Methods: The feasibility and acceptability of clinical intervention algorithms will be determined using a modified Delphi technique followed by the use of clinical vignettes.

Project 2: Interprofessional preceptorship

Co-Supervisors: Dr Gillian Nisbet (Faculty of Health Sciences), Dr Irene Um
Project Summary: With a growing emphasis on interprofessional education and interprofessional collaboration in healthcare, preceptors are increasingly working with and precepting trainees or students from various professions (i.e. interprofessional preceptorship or supervision), either formally or informally, to deliver patient centred care and optimise health outcomes [2]. A study found students perceived supervision from educators whose profession differed from theirs as a beneficial and rewarding experience [3]. Further, "supportive, clinician-focused, content-oriented supervision offered by knowledgeable and skilled clinical experts was perceived as beneficial, regardless of the supervisor's profession" [4]. However, there is a paucity of literature regarding best practice in interprofessional preceptorship, and the competencies required by preceptors to best facilitate trainees or students in such contexts. We are interested in exploring the role of preceptors in precepting students or trainees from different health professions. These findings will inform us towards development of best practices and guidelines to be used in preceptor development.

Methods: Literature review to identify competencies required by preceptors to teach students or trainees from different professions; conduct one-on-one qualitative interviews with a purposive sample of preceptors to explore how they precept trainees from different professions

References: 1. Roughead EE, Semple SJ. Medication safety in acute care in Australia: where are we now? Part 1: a review of the extent and causes of medication problems 2002–2008. Australia and New Zealand Health Policy. 2009 Dec;6(1):18. 2. World Health Organization (2010). Framework for Action on Interprofessional Education & Collaborative Practice. World Health Organization (WHO), Geneva; 3. Grace S & Morgan A (2015) Students' Experiences of Interprofessional Supervision: Shared Characteristics of the Caring Professions. Journal of Integrative Medicine and Therapy, 2(1):4; 4. Townend, M (2005). Interprofessional supervision from the perspectives of both mental health nurses and other professional in the field of cognitive behavioural psychotherapy. Journal of Psychiatric and Mental Health Nursing, 12(5):582–588.

Dr Irene Um
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I am a pharmacist and my research interest is to transform the pharmacy profession towards meeting present and future societal needs, this includes upskilling pharmacists in the provision of services. I am especially interested in weight management, and obesity. I see pharmacists to have great potential in promoting healthy lifestyle to the community, and contributing to Australia's fight against obesity.

Academic Profile http://sydney.edu.au/pharmacy/about/people/profiles/irene.um.php

Research Group See Dr Carl Schneider

Project 1: Are you taking a weight loss pill or supplement?

Co-Supervisors: Dr Betty Chaar, Dr Joanna Harnett
Project Summary: Obesity in Australia is one of the biggest public health challenges facing the population. More than 60% of Australian adults are obese and almost 10% are severely obese. Losing weight is difficult, and weight loss product manufacturers' extravagant claims of "guaranteed results" or "quick fix" may be an attractive option for consumers. However, there is potential for harm especially when weight loss products are used without medical supervision, and unregulated products can be purchased online.
The project will involve disseminating a survey to identify consumer preferences, their behaviours and knowledge surrounding weight loss and healthy lifestyle; and determining potential for harm by investigating medical history.
Potential significance of this project includes obtaining information about consumers' uptake of weight loss products, which may help inform pharmacists and other healthcare professionals potential avenues for intervention.

Methods: Honours student will (a) conduct a literature review to identify where consumers seek information about weight loss; (b) help design, disseminate, and analyse results of a descriptive cross sectional survey of consumer trends relating to weight loss products

Project 2: A Healthy Lifestyle Program on University campus

Co-Supervisor: Dr Betty Chaar
Project Summary: Pharmacies represent a valuable opportunity to deliver weight management services, rather than just the routine supply of weight loss products. To promote evidence-based practice, a best practice model program has been developed. This pharmacist-led weight management service called the A Healthier Life Program was pilot tested in Australia between February and December 2013. Eight pharmacies provided the service, and 34 participants enrolled. The mean change in weight was -3.5 kg and waist circumference -2.0 cm at 3 months or program end. Similar pharmacist-led wellness or weight loss programs have shown to be successful in producing positive health outcomes on University or college campuses in USA.
The project will involve a pilot study, initially adapting the A Healthier Life Program to be feasible on University campus, delivering the program, and evaluating outcomes.

Methods: Honours student will (a) conduct a literature review to identify the different types of University campus-based wellness or weight loss programs; (b) help conduct a pilot study of A Healthier Life Program on University campus and analyse outcomes

References: Um, I., Krass, I., Armour, C., Gill, T., Chaar, B. (2015). Developing and testing evidence-based weight management in Australian pharmacies: A Healthier Life Program. *International Journal of Clinical Pharmacy*, 37(5), 822-833.

Dr Pegah Varamini
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In my laboratory, we develop new therapies for targeted treatment of Triple Negative Breast Cancer (TNBC). It has a poor prognosis mainly because no targeted therapy is available. Another area of my research is to develop targeted nano-pharmaceuticals for prevention/treatment of cancer bone metastasis. We use a number of different cell-based models and imaging systems to evaluate the biological behaviour of our delivery systems and nanoformulations.

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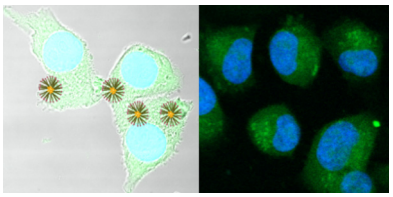
Research Group PhD candidates (Sepideh Khazeni), MPhil candidate (Iram Irshad and Nadeem Ahmed), Honours Students (Gilbert Wai Kwan Li and Cindy Tran), Visiting Research Trainee (Ghada Abueid), Medical Student (Jovana Babic)

Project 1: LHRH-receptor targeted delivery of anti-neoplastic agents to breast cancer cells

Co-Supervisor: Prof. David (Dai) Hibbs

Project Summary: Breast cancer is the most common malignancy and the second leading cause of cancer-related death among Australian women. Triple-negative breast cancer (TNBC) accounting for 10-17% of all breast carcinomas, is an aggressive histological subtype. It represents an important clinical challenge because these cancers do not respond to the available targeted agents. Thus, there is an urgent demand for specific therapies. We have designed and synthesized a novel drug delivery system, which targets antineoplastic agents to the breast cancer cells through a ligand of luteinizing hormone-releasing hormone (LHRH) receptors. We have taken advantage of this differential receptor expression by attaching a new derivative of the LHRH peptide (as a targeting moiety) to the outer surface of polymer nanoparticles (NPs). These NPs encapsulate the anticancer drug and delivers it to the breast cancer cells.

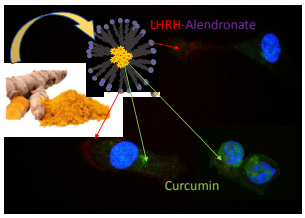


Methods: Nanoparticle formulation and characterization using DLS and HPLC, Cell-based assays including antiproliferative activity (MTS) assay, live-cell imaging (IncuCyte) and receptor-mediated uptake.

Project 2: A multitargeted nanoformulation to prevent and treat breast cancer bone metastasis

Co-Supervisors: A/Prof. Matthew Naylor, Prof. Rebecca Mason

Project Summary: This project aims to investigate the preventative/therapeutic effects of curcumin NPs co-targeted with bisphosphonates (bone seeker drugs) and LHRH peptide in breast cancer bone metastasis. Curcumin, a non-toxic plant extract has recently attracted much attention in medicine due to its remarkable therapeutical actions. We have demonstrated that a bisphosphonate targeted NP of curcumin significantly promoted its anti-cancer activities. In this project, we investigate the dual targeting potentials of bisphosphonate-LHRH-functionalized curcumin NPs to prevent breast cancer cells from spreading to the bones, and kill lodged cancer cells in the bone. We will prepare these NPs based on our previous method and look at their targeting activity to the bone mineral and breast cancer cells. We also test the NPs effect on the migration and metastasis.



Methods: Nanoparticle formulation and characterization, antiproliferative activity (MTS) assay and live-cell imaging (IncuCyte), bone mineral affinity and anti-bone resorption assay, cell uptake.

References: 1) Varamini P. et.al. (2017) New gonadotropin-˘releasing hormone glycolipids with direct antiproliferative activity and gonadotropin-˘releasing potency. Int J Pharm 521:327-˘336. 2) Stephenson, R., Varamini, P., Butcher, N., Minchin, R., Toth, I. (2014). Effect of lipidated gonadotropin-releasing hormone peptides on receptor mediated binding and uptake into prostate cancer cells in vitro. Nanomedicine: Nanotechnology, Biology, and Medicine, 10(8), 1799-1808.

Associate Professor Nial Wheate
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My two main research interests are the use of macrocycles as drug delivery vehicles, including cucurbiturils, cyclodextrins, calixarenes and pillar[n]arenes. I also have an interest in platinum-based cancer drugs from their design and synthesis to the quality of use of platinum drugs in the acute hospital setting.

Academic Profile http://sydney.edu.au/pharmacy/about/people/profiles/nial.wheate.php

Project 1: Preparation of reference standards and testing of party-drugs

Co-Supervisor: Dr Oliver Sutcliffe (Manchester Metropolitan University, England)
Project Summary: This is an international honours project that will require the student to spend semester 2, 2019 in England working at Manchester Metropolitan University. Dr Sutcliffe's team at MMU are focused on illicit or abused drug analysis/detection and new psychoactive substances (NPS, formally known as "legal highs"). The research group also operates MANDRAKE, a scientific resource based at MMU, working in partnership with key stakeholders to facilitate rapid, robust and cost-effective chemical analysis for harm-reduction/intelligence sharing within the Greater Manchester Region. The student will work on a project relevant at the time (2019) to combating the illegal use new psychoactive substances.

Example paper: Chemical synthesis, characterisation and in vitro and in vivo metabolism of the synthetic opioid MT-45 and its newly identified fluorinated analogue 2F-MT-45 with metabolite confirmation in urine samples from known drug users, Forensic Toxicology (2018), 36 (2), 359-374.

Methods: chemical spectroscopy and organic synthesis.

Project 2: Co-morbidity and platinum drug use

Co-Supervisor: Dr Danijela Gnjidic
Project Summary: Cancer is primarily a disease of old age, and at this stage of a person's life they may have be affected by co-morbidity. As such, the drugs a patient may be taking for their co-morbidities may not be compatible with their chemotherapy. This project will examine recent chemotherapy patient data taken from an acute care setting to examine and report on possible drug-drug interactions with a specific focus on patients being treated with at least one platinum-based drug (cisplatin, carboplatin, oxaliplatin).

Example paper:
Patterns of platinum drug use in an acute care setting: a retrospective study, Journal of Cancer Research and Clinical Oncology, 2018, 144(8), 1561-1568.

Methods: Project will require the student to spend some time at Chris O'Brien Life House collecting patient data.