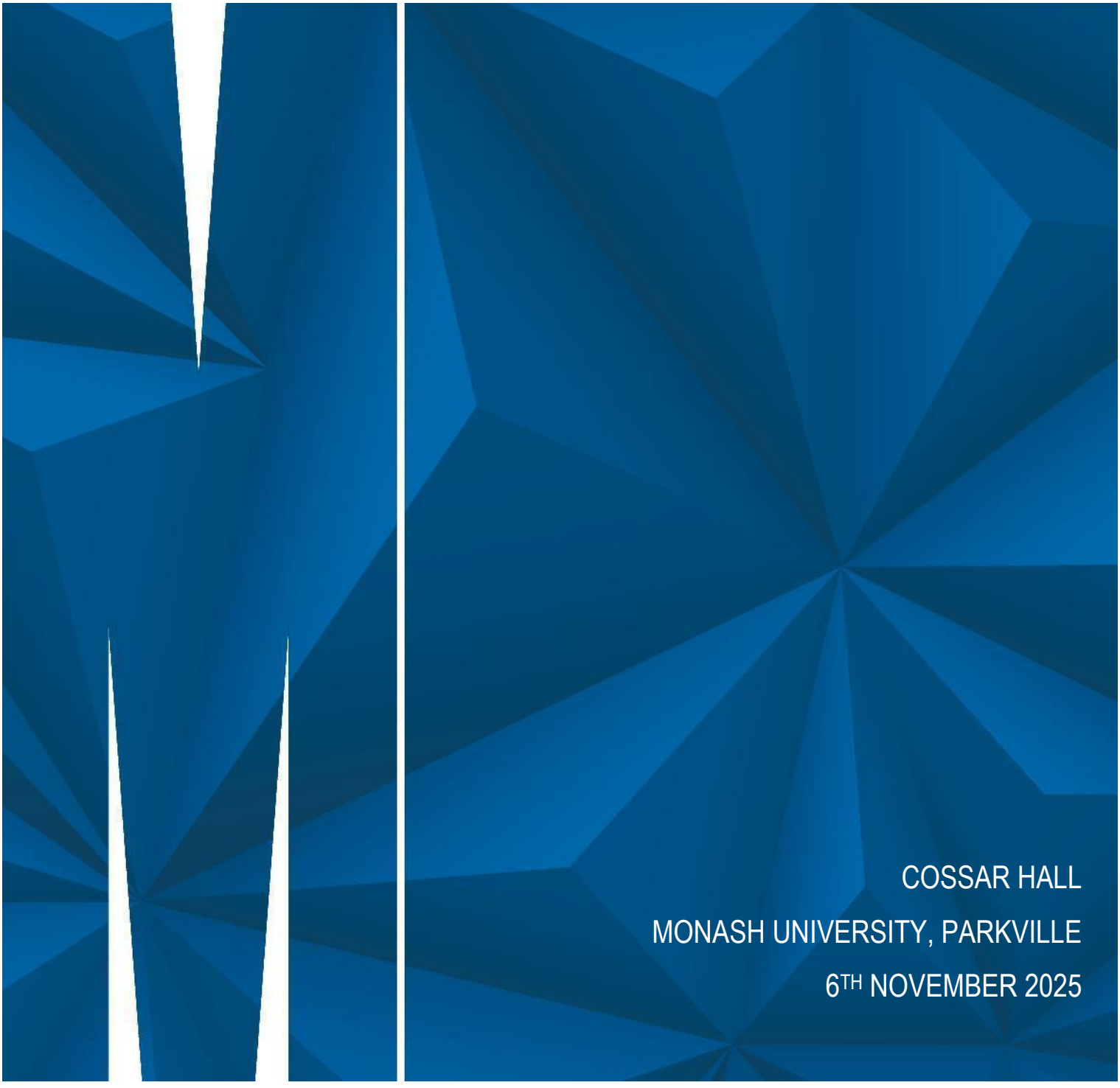
MONASH University

PARKVILLE POSTGRADUATE ASSOCIATION

PHARMACY AND PHARMACEUTICAL SCIENCES

20TH ANNUAL FACULTY OF PHARMACY & PHARMACEUTICAL SCIENCE HIGHER DEGREE BY RESEARCH SYMPOSIUM



COSSAR HALL

MONASH UNIVERSITY, PARKVILLE

6TH NOVEMBER 2025

Monash University and the Parkville Postgraduate Association (PPA) gratefully acknowledge the support of the following companies and organisations:

Contents

ABBREVIATIONS

CMUS	Centre for Medicine Use and Safety
DDB	Drug Discovery Biology
D4	Drug Delivery, Disposition, and Dynamics
MedChem	Medicinal Chemistry
PPSEd	Pharmacy and Pharmaceutical Sciences Education

SYMPOSIUM PROGRAM

Registration	SISSONS BUILDING FOYER
8:00 - 8:45 am	**Registration**
Opening Ceremony	LECTURE THEATRE 5
9:15 - 9:25 am	Symposium Opening Remarks ***A/Prof Karen Gregory*** (Associate Dean, Graduate Research of FPPS)
9:25 - 10:00 am	Keynote Plenary ***Dr Simona John von Freyend*** *(Managing Director & CEO of PTNG Scientific)*
Oral Presentation Session 1 ***Chairs:*** *Jiawen (Yannee) Liu, MacKenzie Bell*	LECTURE THEATRE 5
10:00 - 10:15 am	Does the structure of lipid mesophase nanoparticles affect their digestion? ***Qianying Chen*** *(D4)* ***(1)***
10:15 - 10:30 am	Second Generation Benzothiazole PfA-M1/PfA-M17 Dual Inhibitors as Antimalarial Agents. ***Drew Knott*** *(MedChem)* ***(2)***
10:30 - 10:45 am	Development and Validation of Pharmacology Concept Inventory for Concept-Based Learning: Leveraging Theory, Expert Insights, and Student Perspectives. ***Adeladlew Kassie Netere*** *(PPSEd)* ***(3)***
10:45 - 11:00 am	Understanding Activation and Structures of Glucagon Receptor. ***Elaine Ye Jiang*** *(DDB)* ***(4)***
Morning Tea & Poster Viewing	COSSAR HALL
11.15 - 11.50 am	**Morning Tea & Poster Viewing**
Poster Presentation Session 1: Group A *(concurrent)* ***Chairs:*** *Yingshan (Emma) Dong, Yijia Xu*	COSSAR HALL
11:15 - 11:20 am	The use of Virtual Twins in physiologically-based pharmacokinetics: A perspective review. ***Emily Mannix*** *(CMUS)* ***(1)***
11:20 - 11:25 am	Examining the therapeutic potential and immunomodulatory mechanism of a lymph-targeted celecoxib prodrug in inflammatory bowel disease. ***Jiayan He*** *(D4)* ***(2)***
11:25 - 11:30 am	Dose Optimisation of Anakinra in Preterm Neonates using Mechanistic Population Pharmacokinetic Approaches. ***Jia Li*** *(CMUS)* ***(3)***
Poster Presentation Session 1: Group B *(concurrent)* ***Chairs:*** *Jiaying (Joy) Li, Thomas Pirotta*	COSSAR HALL
11:15 - 11:20 am	Trends and costs of potentially inappropriate medications. ***Jiawen (Yannee) Liu*** *(CMUS)* ***(4)***
11:20 - 11:25 am	Fluorescent tools to diagnose dementia. ***Paulo M. Simon*** *(MedChem)* ***(5)***
11:25 - 11:30 am	A critical systematic review of methodologies and modelling approaches in the treatment of hyperlipidaemia. ***Karl Vivoda*** *(CMUS)* ***(6)***
11:30 - 11:35 am	Structural and pharmacological validation of allosteric sites at the M5 Muscarinic acetylcholine receptor – a target for CNS disorders. ***Bhavika Rana*** *(DDB)* ***(7)***
Oral Presentation Session 2 ***Chairs:*** *Paulo M. Simon, Zi Xing Mun*	LECTURE THEATRE 5

11:50 - 12:05 pm	Structural and Dynamic Insights into How Retatrutide Achieves Triple Agonism. ***Kenta Ishii*** *(DDB)* ***(5)***
12:05 - 12:20 pm	Resolution of Inflammation is Impaired in the Sugen-Hypoxia Mouse Model of Pulmonary Arterial Hypertension in a Sex Specific Manner. ***Chloe Landy*** *(DDB)* ***(6)***
12:20 - 12:35 pm	Insomnia treatment preferences in older adults and people living with dementia: A qualitative study. ***Aisling McEvoy*** *(CMUS)* ***(7)***
12:35 - 12:50 pm	Targeting Sphingolipid Signalling in Metabolic Disease. ***Hannah Middleton*** *(MedChem)* ***(8)***
12:50 - 01:05 pm	Temporal and spatial dynamics of SSTR2 and SSTR4 signalling. ***Eric Le*** *(DDB)* ***(9)***
Lunch & Poster Viewing	COSSAR HALL
1.05 - 2:00 pm	**Lunch & Poster Viewing**
Poster Presentation Session 2: Group A *(concurrent)*	COSSAR HALL
Chairs: *Yingshan (Emma) Dong, Yijia Xu*	
1:05 - 1:10 pm	Changing Glucose Lowering Drugs Patterns in Australia: General vs Neurodegenerative Populations (2015–2024). ***Qingke (Demi) He*** *(CMUS)* ***(8)***
1:10 - 1:15 pm	Development of Advanced Colorectal Cancer In Vitro Models for Evaluating Nanoparticle-Based Drug Delivery Systems. ***Wen Ao BONG*** *(D4, Monash University Malaysia)* ***(9)***
1:15 - 1:20 pm	Pharmacological Studies of Novel Constrained Melanocortin Peptides. ***Li Jia*** *(MedChem)* ***(10)***
1:20 - 1:25 pm	Applying the Bradford Hill Criteria to Assess the Independent Causal Roles of Ageing and Polypharmacy in Frailty Progression: A Systematic Review. ***Subindra Kazi Thapa*** *(CMUS)* ***(11)***
1:25 - 1:30 pm	Combinatorial Design of Orally Bioavailable Cyclic Peptides Targeting Somatostatin Receptor 2. ***Mindi Li*** *(MedChem)* ***(12)***
1:30 - 1:35 pm	Which antimicrobial stewardship interventions do pharmacy students resonate with the most? ***Shahd Issa Alzard*** *(PPSEd)* ***(13)***
1:35 - 1:40 pm	Prevalence of benzodiazepine, Z-drug, and melatonin use in Australian residential aged care facilities. ***Yuxing Liu*** *(CMUS)* ***(14)***
Poster Presentation Session 2: Group B *(concurrent)*	COSSAR HALL
Chairs: *Jiaying (Joy) Li, Zi Xing Mun*	
1:05 - 1:10 pm	Developing New Chemical Tools to Understand the Biology of Fatty Acid Binding Protein 4. ***Imesha Lakmini Hettige*** *(MedChem)* ***(15)***
1:10 - 1:15 pm	Hidden Costs of Breast Cancer: Direct Non-Medical and Productivity Losses in Indonesia. ***Rizka Prita Yuliani*** *(CMUS)* ***(16)***
1:15 - 1:20 pm	Expanding the toolbox of PEG alternatives – evaluation of the hydrophilicity of poly(cyclic imino ether)s. ***Kelly Mint*** *(D4)* ***(17)***
1:20 - 1:25 pm	Development of selective MC1R theranostic. ***Phil Adriaan*** *(MedChem)* ***(18)***
1:25 - 1:30 pm	Bridging the AI Literacy Gap: Developing and Validating an Assessment of GenAI Competencies for Pharmacy Education. ***Thai Duong Pham*** *(PPSEd)* ***(19)***
1:30 - 1:35 pm	Metabolic Fingerprinting of Cell Cultures via Micropillar-Structured Dual Glucose and Lactate Biosensor. ***Masoud Khazaei*** *(D4)* ***(20)***
1:35 - 1:40 pm	Using Pharmaceutical Benefits Scheme claims to identify and investigate gender affirming hormone therapy. ***Sam Wade*** *(CMUS)* ***(21)***
Oral Presentation Session 3	LECTURE THEATRE 5
Chairs: *Amelia Miklavec, Hannah Middleton*	

2:05 - 2:20 pm	Understanding The Contributing Factors and Impact of Burnout on Malaysian Pharmacists in Their Respective Healthcare Organisations (Government and Private). ***Freda Jong Jia Xin*** *(CMUS, Monash University Malaysia)* ***(10)***
2:20 - 2:35 pm	Teaching clinical skills with MyDispense: Insights from an Indonesian university. ***Lailaturrahmi*** *(PPSEd)* ***(11)***
2:35 - 2:50 pm	Exploring sex differences in metabotropic glutamate receptor 5 negative allosteric modulators. ***Jackson Kos*** *(DDB)* ***(12)***
2:50 - 3.05 pm	Treatment patterns and predictors of Second-line Glucose-Lowering Therapy in Adults with Type 2 Diabetes in Australia. ***Thu Hang Nguyen*** *(CMUS)* ***(13)***
3:05 - 3:20 pm	Using nanobodies to facilitate drug delivery across the blood-brain barrier in gliomas. ***Pranav Runwal*** *(D4)* ***(14)***
Afternoon Tea & Closing Ceremony	COSSAR HALL
3.20 - 4:00 pm	**Afternoon Tea & Poster Viewing & People's Choice Voting & Networking**
4:00 - 4:30 pm	Symposium Closing & Award Ceremony ***Dr Amandeep Kaur*** *(Senior Lecturer, ARC DECRA Fellow & Graduate Research Coordinator for MedChem)*

PARKVILLE POSTGRADUATE ASSOCIATION

The **Parkville Postgraduate Association (PPA)** is the representative body for postgraduate students at Monash University Parkville Campus. PPA plays a diverse and multi-faceted role in academic, cultural and social aspects of student life. In addition to organising a multitude of social, academic and career events, PPA provides a means of representation for postgraduate students at the Parkville campus.

Role	Member	Theme
President	Paulo M. Simon	MedChem
Vice President	Abbey Muller	MedChem
Treasurer	Zi Xing Mun	D4
Secretary	Jiawen (Yannee) Liu	CMUS
MGA Representative	Vidhi Agarwal	MPharmSci
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	Jiaying (Joy) Li	D4
	Yingshan (Emma) Dong	DDB
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	Hanna Pham	Pharm. Intern
EMCR Rep.	Darshna Goordeen	CMUS
Honours Rep.	Olivia Capitanio	MedChem
	Anshuman Bhattacharyya	D4
General Members	Alice Terrill	D4
	Yunyang (Eileen) Zhou	D4

PLENARY SPEAKER

Dr. Simona John von Freyend

LinkedIn Page

Dr. Simona John von Freyend is the Managing Director of PTNG Scientific and PTNG Consulting, leading teams that provide innovative solutions for the biotech industry through computational modelling, structural biology, and protein engineering. She holds a PhD in cell biology and infectious diseases from the University of Hamburg, having conducted research at Strathclyde University (UK) and the Bernhard-Nocht Institute for Tropical Medicine (Germany). Her postdoctoral research brought her to Australia, where she worked at the University of Melbourne's Bio21 Institute and Monash University's Department of Microbiology, progressing from Research Fellow to Senior Research Fellow.

At PTNG, Simona combines her scientific expertise with strategic development, grant design, and team leadership to help biotech and pharma companies streamline discovery and development processes. She frequently shares case studies demonstrating how computational modelling can fast-track innovation while identifying areas of potential risk for the industry. Passionate about science communication, she also contributes to Biovidera Scientific Studios, creating accurate scientific visuals and fostering connections between researchers, industry, and creative design to accelerate advancements in drug discovery and medicine.

JUDGES

Thank you to the symposium judges for their time and contributions:

JUDGES	THEME
Oral Presentations	
Dr. Kimberly Vo	PPSEd
Dr. Felix Bennetts	DDB
Dr. Laura FitzGerald	MedChem
Dr. Michelle Tan	CMUS
Dr. Will De Nardo	D4
Poster Presentations Group A	
Dr. Alene Yong	CMUS
Dr. Changhe Zhang	D4
Dr. Karoline Sanches (AM Session)	MedChem
Dr. Dorothy Wai (PM Session)	MedChem
Dr. Selena Peng	DDB
Poster Presentations Group B	
Dr. Bui San Thai	DDB
Dr. Daniel McNaughton	MedChem
Dr. Madeleine Tan	CMUS
Dr. Mitchell Trickey	D4

RESEARCH BACKGROUND OF JUDGES

Oral Presentations Session

Dr. Kimberly Vo

Dr Kimberly Vo is the Ware Research Fellow at Monash University. She holds a PhD in Chemistry Education Research, where she implemented and evaluated a metacognitive scaffold, Goldilocks Help, to enhance problem-solving skills among undergraduate students. Her research has been published in the Chemistry Education Research and Practice journal and now extends to exploring how MyDispense, a high-fidelity dispensing simulation, and skills coaching can foster problem solving, professional skills, and reflective practice in Pharmacy education.

Dr. Felix Bennetts

Felix Bennetts is a Research Fellow at the Monash Institute of Pharmaceutical Sciences, Monash University, working under the supervision of Associate Professor David Thal and Dr. Sabatino Ventura. He completed his PhD in October 2024, with a focus on the structural and functional characterisation of the P2X1 receptor. Felix's current research aims to therapeutically target the P2X1 receptor for the development of non-hormonal, oral male contraceptives. With support from MCI funding, his work contributes to drug discovery efforts focused on identifying potent compounds suitable for future clinical application. In addition to his work on the P2X1 receptor, Felix has a broader interest in membrane proteins, with a focus on using structural biology and pharmacology to identify druggable binding sites and guide the development of small molecule therapeutics.

Dr. Laura FitzGerald

Dr Laura FitzGerald is a postdoctoral research fellow in the Kaur Group at Monash University, working on fluorescent tools for super-resolution imaging. She completed her PhD at the Monash Institute of Pharmaceutical Sciences, where she developed sensors to track the uptake and trafficking of proteins and nanomaterials in cells.

Before joining the Kaur lab, she held a postdoctoral fellowship at CSIRO, studying how metal-organic frameworks can encapsulate and protect biomolecules, including environmental DNA, for applications in environmental sampling and analysis.

Dr. Michelle Tan

Dr Michelle Tan is a Research Fellow at the Centre for Medicine Use and Safety, Monash University, and is contributing to the development of the new National Clinical Practice Guidelines for Dementia. She also holds honorary positions as a Research Fellow (Global Health) at the Department of Health Service and Population Research, Institute of Psychiatry, Psychology & Neuroscience (IoPPN), King's College London, UK, and as a Research Fellow (Health Services) at the Greater Brisbane Clinical School, Faculty of Health, Medicine and Behavioural Sciences, The University of Queensland (UQ). She has a strong interest and expertise in rigorous evidence synthesis methods, advanced statistical analyses, and leveraging large-scale longitudinal datasets to translate evidence into practice and inform national health policies. Her research spans health services, multimorbidity, healthy ageing, cardiovascular and metabolic diseases, surgery, and mental health.

Michelle completed her PhD in Medicine at the Central Clinical School, The University of Sydney, focusing on longitudinal research to improve a multidisciplinary publicly funded bariatric surgery service integrated with a range of adjunct treatments across three hospitals in NSW. Her research program targeted highly complex

patients with clinically severe obesity and multiple comorbidities, meaningfully supporting real-world data-driven improvements to publicly funded metabolic and bariatric care pathways.

Michelle has successfully obtained nearly 20 competitive awards and research funding exceeding $1 million, including an NHMRC Ideas Grant for a national linkage program. Beyond her collaborations across the UK and Australia, her interdisciplinary network extends to more than 20 countries, including Malaysia. She is passionate about nurturing future researchers and translating evidence to improve real-world health outcomes.

Dr. Will De Nardo

Dr William De Nardo is a Postdoctoral Research Fellow in Professor Trevaskis's laboratory at Monash Institute of Pharmaceutical Sciences where he investigates modes to enhance mRNA-LNP delivery towards the lymph node and how changes in lymphatic-secreted proteins are remodelled in the context of obesity, insulin resistance, and microgravity to promote atrophy, mitochondrial dysfunction and fibrosis. Dr De Nardo's doctoral work explored how obesity remodels liver-secreted proteins in humans and mice, leading to the identification of novel biomarkers and paracrine and endocrine regulators of liver fibrosis, insulin resistance, and adiposity. His current research employs a broad suite of advanced techniques, including in vivo, ex vivo, and in vitro metabolic assays, multi-omics (proteomics, lipidomics, and metabolomics), precision-cut tissue slicing, and the use of isotopic and radiometric tracers to investigate nutrient flux and cellular signalling.

Poster Presentations Session

Dr. Alene Yong

Dr Alene Sze Jing Yong is a public health researcher, and a research fellow at the Centre for Medicine Use and Safety, Faculty of Pharmacy and Pharmaceutical Sciences. Her research focuses on improving the delivery of health services and implementing evidence-based practices. She has expertise in diverse methodologies, including evidence review and synthesis, mixed-method studies, and preference elicitation.

Alene's recent work includes developing Australia's first clinical practice guidelines for the use of emerging and innovative treatment options in certain mental health conditions. Her PhD research utilised discrete choice experiments and qualitative interviews to understand and quantify cancer patients' values regarding quality-of-life outcomes. Before joining CMUS, Alene worked as a community pharmacist and collaborated as a research consultant on numerous local and international projects, including health financing in low-resource settings, patient navigation in cancer care, and addressing barriers to accessing health services.

Alene is driven by her passion for translating research outcomes into policy, clinical practice, and tangible positive impacts for the community.

Dr. Bui San Thai

Dr Bui San Thai is a Postdoctoral Research Fellow in the Cardiac GPCR Biology Lab with A/Prof Lauren May at Monash University, specialising in GPCR pharmacology and cardiovascular (patho)physiology. She completed her B.Pharm.Sci. (Honours) in 2016 and PhD in 2021, focusing on adenosine receptors as therapeutic targets for myocardial infarction and heart failure, particularly in the context of ageing and diabetes.

Currently, Dr Thai investigates the adenosine A1 receptor using human-induced pluripotent stem cell models to explore its potential in treating cardiovascular disease and epilepsy. Her work supports the development of innovative, targeted therapeutics.

Dr. Changhe Zhang

Changhe has a PhD degree in synthetic organic chemistry. Since his graduation, he has been working on bio- and nanomaterials for applications including drug delivery, antimicrobial materials, and biosensing. His expertise includes designing and synthesising novel polymers, linkers, conjugates, and nanoformulations, tailored to specific problems, leveraging a strong molecular-level understanding of biomaterials to tackle complex challenges through synthetic chemistry.

Dr. Daniel McNaughton

Daniel completed his PhD in Chemistry at the University of Sydney under the supervision of Professor Phil Gale, focusing on the development of synthetic anion transporters for biological applications. His research involved the design and synthesis of supramolecular systems capable of translocating anions across lipid bilayers, and he employed a range of vesicle-based assays and cell studies to evaluate activity and mechanisms of action. During his PhD and subsequent postdoctoral work at UTS, he explored challenges in transporter deliverability and selectivity, contributing to a broader understanding of their therapeutic potential. He also assisted in the supervision of multiple Honours students, collaborated across several interdisciplinary projects, and co-authored over 20 peer-reviewed publications.

Daniel is currently a Research Fellow in the laboratory of Professor Peter Scammells at the Monash Institute of Pharmaceutical Sciences, where his work focuses on the development of allosteric and bitopic ligands for G protein-coupled receptors (GPCRs). His research targets the muscarinic acetylcholine receptor family, with an emphasis on the M1 and M4 subtypes, which are of significant therapeutic interest for the treatment of neurodegenerative and psychiatric disorders such as Alzheimer's disease and schizophrenia. This role bridges synthetic medicinal chemistry, pharmacological profiling, and structure-based ligand design.

Dr. Dorothy Wai

Dr Dorothy Wai completed her PhD at the University of Sydney in 2017, using NMR and other biophysical techniques to characterise protein-protein and protein-RNA interactions that regulate mammalian gene expression. Since moving to MIPS, she has worked on highly collaborative fragment-based drug discovery projects against protein targets in type 2 diabetes and graft-versus-host disease, utilising her experience in molecular biology, protein biochemistry and structural biology. Her current research focuses on developing peptides that inhibit the potassium channel KV1.3, a novel molecular target in neurodegenerative disease, with the aim of generating therapeutic leads that have improved brain permeability and pharmacokinetic properties. Her work has attracted competitive funding and has the potential to expand the currently limited therapeutic options available to people with neurodegenerative disorders.

Dr. Karoline Sanches

Dr Karoline Sanches is a Structural Biologist and Protein Biochemist with over 14 years of experience in recombinant protein expression, purification, and structural characterization. Their expertise spans membrane proteins, NMR structure determination, and biophysical assays for protein–ligand interactions.

Dr Karoline Sanches has led and contributed to interdisciplinary drug discovery and therapeutic development projects across Australia, the USA, Europe, and Brazil, demonstrating a strong record of international collaboration. They were awarded the prestigious Mollie Holman Medal for the best PhD thesis in the Faculty of Pharmaceutical Sciences at Monash University, and have authored 14 peer-reviewed publications and contributed 4 structures to the Protein Data Bank.

Dr. Madeleine Tan

Dr Madeleine Tan is a Research Fellow at the Centre for Medicine Use and Safety, Monash University, and a credentialed pharmacist in Medication Management Review (MMR). She has broad pharmacy practice experience across community, hospital, aged care, academic, and government settings.

Madeleine completed her Bachelor of Pharmacy with Honours in 2016 and her PhD in 2022, both from The University of Queensland. Her doctoral research focused on developing an intranasal formulation for the nose-to-brain delivery of clozapine, aiming to reduce peripheral adverse drug reactions and improve treatment compliance in patients with treatment-resistant schizophrenia.

Following her PhD, Madeleine worked as a Senior Clinical Pharmacist – Research in the Medicines Management Unit at the Northern Territory Department of Health, contributing to several digital health initiatives. She then held a short-term academic appointment as a Lecturer in Pharmacy Practice at Charles Darwin University, supporting the Master of Pharmacy (Extended) program through curriculum development and clinical teaching. She later returned to clinical practice as a Senior Pharmacist in Mental Health at Monash Health before transitioning to her current research role at Monash University.

Dr. Mitchell Trickey

Dr Mitchell Trickey is a research fellow at Monash University focused on identifying novel antimalarial therapeutics to combat the rise in parasite mediated drug resistance. Mitchell completed his PhD at Deakin University in 2025 where his project was focused on identifying nutrient pathways in the causative agent of malaria, as potential therapeutic targets. Mitchell has published multiple papers outlining novel methodologies for the investigation of nutrient channels and the characterisation of essential proteins utilising genetic engineering techniques in both human and rodent species of malaria. Mitchell has since joined the Creek laboratory at Monash Institute of Pharmaceutical Sciences (MIPS) utilising his expertise in malaria parasite microbiology and cell biology to identify potent antimalarial drugs and their mechanisms of action. Additionally, his work at MIPS applies systems biology techniques including metabolomics to better understand the complex biology of parasites, drug dynamics and drug target deconvolution.

Dr. Selena Peng

Selena has recently completed her PhD and is currently a research fellow from the Cardiovascular Pharmacology laboratory led by Dr Helena Qin. Selena completed her bachelor of science degree from the University of Melbourne in 2018 where she majored in pharmacology. She completed her Master of biomedical science with Professor Rebecca Ritchie and Dr. Helena Qin in 2020 at the Baker Institute. In 2021, Selena received the Research Training Program (RTP) scholarship as well as the Monash Graduate Excellence top up scholarship (MGES) to commence her PhD in the drug discovery biology theme. Selena's PhD project focused on fine-tuning formylpeptide receptor 2 activation to understand the signalling bias and binding mode of FPR2 ligands. This PhD project was supervised by Dr Helena Qin, Dr Elva Zhao, Dr Elizabeth Vecchio, Professor Owen Woodman and Professor Rebecca Ritchie.

AWARDS AND PRIZES

Thank you to the generous sponsors for providing the following prizes:

AWARDS	PRIZES	SPONSORS
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Most Outstanding Oral Presentation	$500.00	Bio-Strategy
Second Place Oral Presentation	$300.00	Fisher Biotec
Third Place Oral Presentation	$150.00	Promega
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Oral Presentation Encouragement Award	$100.00	Capella
Poster		
Most Outstanding Poster Presentation	$300.00	Enimera RegsPlus
Second Place Poster Presentation	$200.00	Mettler Toledo
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People's Choice Poster Presentation Award	$150.00	Formulytica
Poster Presentation Encouragement Award	$100.00	ADKL Labs

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ADKL Labs Pty Ltd is an Australian-based Contract Research Organisation. It offers expertise on a variety of platforms including Chemistry services, Analytical Chemical testing services and distributions of all specialised glassware, lab equipment and fine chemicals.

ADKL Labs' mission is to deliver high-quality, reliable, and innovative scientific solutions that support the development of advanced chemical processes, drug design, and analytical testing. The company focuses on offering tailored services in:

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2. *Impurity analysis, purification and characterisation using analytical techniques such as Chromatography (LC, GC & SFC), Mass Spectrometry, and NMR to help clients achieve their research and development goals.*
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With a deep commitment to integrity, expertise, and collaboration, ADKL Labs aims to empower clients by providing insights that go beyond traditional analytical perspectives, ultimately driving success in drug discovery and other chemical advancements. Their mission emphasises building long-term, trusted partnerships with clients through a combination of innovative approaches, technical expertise, and exceptional customer service. By offering a comprehensive suite of services, ADKL Labs ensures that each client's needs are met with precision and efficiency.

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Website *LinkedIn* *Video Intro*

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ABSTRACTS

Oral Presentation

Adeladlew K. Netere

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Adeladlew Kassie Netere is a PhD candidate in Pharmacy Education at Monash University's Faculty of Pharmacy and Pharmaceutical Sciences. With a background in clinical and pharmaceutical sciences, he has experience in both clinical pharmacy practice and teaching. His research focuses on developing and evaluating concept-based educational tools in pharmacology. Since 2022, he has led the design and validation of the Pharmacology Concept Inventory (PCI), a diagnostic tool supporting concept-based pharmacology education.

Development and Validation of Pharmacology Concept Inventory for Concept-Based Learning: Leveraging Theory, Expert Insights, and Student Perspectives

Introduction: Healthcare professional graduates often have misconceptions and marked gaps in their understanding of key pharmacology concepts.

Aim: We designed, developed and validated a pharmacology concept inventory (PCI) to identify students' misconceptions, measure learning gains and evaluate teaching effectiveness strategies.

Methods: The design process employed a triangulated strategy, integrating theoretical frameworks, insights from international pharmacology experts, and student perspectives. A mixed-methods approach combined both quantitative and qualitative analyses.

Result: A pilot PCI consisting of 26 items was developed and validated. The item-level content validity index ranged from 0.67 to 1.00, with an average scale-level score of 0.93 across seven core concepts. Discrimination indices ranged from 0.36 to 0.75, and difficulty indices from 0.26 to 0.71. The test showed high internal consistency (Cronbach's alpha = 0.91) and moderate to strong reliability at the concept level (0.64–0.85).

Discussion: The PCI serves as a diagnostic tool to identify misconceptions, guide tailored interventions and enhance learning outcomes. It supports both the evaluation of student learning and the refinement of instructional strategies, enabling evidence-based adjustments to close conceptual gaps and strengthen concept-based learning.

Netere AK, (2025). Developing a Pharmacology Concept Inventory for Concept-Based Learning: Leveraging Theory, Expert Insights, and Student Perspectives.

Aisling McEvoy

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Aisling is a PhD candidate from the Centre for Medicine Use and Safety. Her research focuses on deprescribing benzodiazepine receptor agonists in people living with dementia. She is excited to find non-pharmacological approaches to assist with sleep as a replacement for benzodiazepines and z-drugs. Before starting as a PhD student, Aisling completed her BPharm and MPharm with Monash University. Aisling continues to work as a clinical pharmacist at The Alfred Hospital while completing her PhD.

Insomnia treatment preferences in older adults and people living with dementia: A qualitative study

Introduction: Insomnia is common in people living with dementia and older adults. However, insomnia treatments rarely align with guidelines which recommend non-drug treatment. Commonly prescribed, benzodiazepine receptor agonists (BZRAs) can lead to risk of medication-related harm.

Aims: This research aimed to explore what influences decisions for engaging with drug and non-drug insomnia treatments for older adults, people living with dementia and their carers.

Methods: Semi-structured interviews were conducted with three participant groups. The interviews were conducted and transcribed in Zoom. Participants identified and prioritised factors that influence their treatment decisions. Thematic analysis of transcripts was conducted in Nvivo to identify themes describing participants' beliefs and experiences.

Results: From 19 interviews with 20 participants (Median reported age = 65-74 years, 37% female), 14 factors were identified. Risk of side effects (n=10) and effectiveness (n=7) were most commonly prioritised and frequently reported across all participant groups. Medication side effects on cognition and daytime sedation were frequent concerns of participants. Underpinning these factors were five main themes, with nine sub-themes identified, including external influences, barriers to treatment, treatment expectations, insomnia and sleep beliefs, and treatment type.

Discussion: Decisions about insomnia treatments are influenced not only by expected and experienced treatment effectiveness, but also by perceived risks and health beliefs. Future research (a discrete choice experiment) to quantify how these factors influence patients' insomnia treatment choices is planned. Integrating these perspectives into clinical care may help reduce medication-related harm and promote safer, acceptable alternatives.

Chloe Landy

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Chloe completed a Bachelor of Pharmaceutical Science Advanced (Honours) at Monash University in 2021. In 2022, Chloe began her PhD in the Cardiovascular Pharmacology Laboratory under the supervision of Dr. Chengxue Helena Qin and co-supervision of Dr. Miles De Blasio and Professor Owen Woodman. Chloe's research explores the differences in prevalence and prognoses between men and women living with pulmonary arterial hypertension (PAH). Further, her research aims to identify whether a class of lipids known as specialised pro-resolving mediators are differentially expressed between the sexes in PAH and explore their therapeutic potential.

Resolution of Inflammation is Impaired in the Sugen-Hypoxia Mouse Model of Pulmonary Arterial Hypertension in a Sex Specific Manner

Introduction:

Pulmonary arterial hypertension (PAH) is a life-threatening condition with no cure. PAH is more common in females (F) yet males (M) have worse prognoses. We hypothesised that a failure of the resolution of inflammation contributes to the pathophysiology of PAH in a sex-specific manner.

Methods:

M and F C57BL/6J mice were exposed to either sugen-hypoxia (20 mg/kg sc, weekly in first 4 weeks; 10% O2; SuHx) or normoxia (NmOx). After 8-weeks, mice were euthanised and the lungs were collected. Gene expression was measured by RT-qPCR and lipid concentrations by LCMS. RT-qPCR: Mean(fold-change)±SEM (n=12/group), 2-way ANOVA with Tukey's test. LCMS: correlation coefficient (n=5/group), multiple linear regression.

Results:

Under NmOx conditions F mice had a lower expression of pro-resolving genes Fpr2 and Alox12 than their M counterparts (Table). SuHx depleted the transcription of these genes in both sexes (Table).

	Male NmOx	Male SuHx	Female NmOx	Female SuHx
Fpr2	0.93±0.10	0.44±0.05****	0.64±0.06†	0.36±0.03*
Alox12	1.45±0.16	0.73±0.07****	0.87±0.09††††	0.50±0.05*
*p<0.05,		****p<0.0001 vs NmOx.	†p<0.05,	††††p<0.0001 vs Male.

SuHx exposure was positively correlated with the concentration of pro-inflammatory PGD2 across both sexes (0.58, p<0.001), however the effect of SuHx on PGD2 concentrations was larger in males than females (0.55, p<0.001). The concentration of PGE2 tended to be lower in M than F (-0.35, p<0.05) and was elevated with SuHx exposure exclusively in males (0.50, p<0.01).

SuHx exposure was associated with greater concentrations of the pro-resolving precursors: HEPE-15, HETE-15 and HEPE-18 (0.42, p<0.05; 0.46, p<0.05; 0.56, p<0.01) and lower concentrations of: HEPE-12 and HETE-12 (-0.38, p<0.05; -0.45, p<0.001) in the lungs with no effect of sex. SuHx was associated with higher concentrations of pro-resolving RvE3 in males only (0.41, p<0.05).

Conclusions:

We have demonstrated an impairment of inflammation-resolution in mice with SuHx-induced PAH. Further, resolution of inflammation is impacted by biological sex which may contribute to sex differences observed in PAH patients. Targeting these signalling pathways may be a novel approach for the development of new PAH therapies.

Drew Knott

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Drew completed her Bachelor of Pharmaceutical Science (Honours) in 2022 under the supervision of Peter Scammells, where she focused on the synthesis of novel aminopeptidase P inhibitors as antimalarial agents. The project centred on the development of analogues derived from a hit identified through a DNA-encoded library screen. Building on this work, Drew chose to continue her research within the Scammells group, shifting focus to M1 and M17 aminopeptidases. Her PhD research encompasses the design and synthesis of dual inhibitors, enzyme inhibition assays to evaluate biological activity to build structure-activity relationships, and computational docking studies to elucidate potential binding modes.

Second Generation Benzothiazole PfA-M1/PfA-M17 Dual Inhibitors as Antimalarial Agents

Malaria remains a major global health challenge, with increasing resistance to current therapies highlighting the urgent need for new treatments. The metalloaminopeptidases PfA-M1 and PfA-M17 are essential for parasite survival and are attractive drug targets. Here, we report the design, synthesis, and biological evaluation of a series of second-generation benzothiazole-based dual inhibitors targeting both PfA-M1 and PfA-M17. Guided by structure-activity relationships and enzyme structural data, we modified the S1' pocket substituents to explore new interactions. Several analogues demonstrated sub-100 nM potency against both enzymes and retained modest activity against Plasmodium falciparum parasites. Our results support the potential of benzothiazole dual inhibitors as promising leads for next-generation antimalarial agents.

Elaine Ye Jiang

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Elaine Jiang is a PhD candidate in Drug Discovery Biology in the Metabolic Receptor Biology group (Sexton/Wootten Lab). Her research focuses on the glucagon receptor (GCGR), a key therapeutic target in anti-obesity drug development. Integrating pharmacology and structural biology, her work elucidates canonical and noncanonical receptor activation pathways and biased agonism, providing critical insights for rational drug design. She has determined and deposited five high-resolution GCGR cryo-EM structures in the PDB, with two manuscripts in preparation for Nature Chemical Biology and Nature Communications. Elaine is currently pursuing novel noncanonical G protein–bound GCGR structures to bridge key knowledge gaps in class B GPCR signaling.

Understanding Activation and Structures of Glucagon Receptor

Obesity is a fast-growing global health crisis, with prevalence rates continuing to rise and current treatment options remaining limited. Among therapeutic targets, class B G protein–coupled receptors (GPCRs) have emerged as highly promising for anti-obesity drug discovery, given their central roles in energy and glucose homeostasis. While receptors such as GLP-1R have been intensively studied, the glucagon receptor (GCGR) has received far less structural attention despite its critical role in metabolic regulation. My PhD project aimed to address this gap by applying cryo–electron microscopy (cryo-EM) to reveal activation mechanisms and structures of GCGR in complex with signaling partners and ligands. Achieving this, however, required a significant investment in the biochemical groundwork necessary for producing stable, high-quality receptor samples amenable to cryo-EM. Over the course of my research, I navigated multiple rounds of optimization, such as testing solubilization strategies, stabilizing constructs, binding partners, and detergents, to identify conditions that could preserve functional receptor complexes during vitrification. These systematic trials and setbacks ultimately paved the way to exciting structural breakthroughs, capturing the receptor in distinct active states. In this presentation, I will take the audience through the experimental journey, emphasizing the biochemical challenges encountered and overcome, and highlight the structural insights obtained at the end of this arduous but rewarding process. These findings not only advance our understanding of GCGR biology but also serve as a foundation for developing more selective and effective therapeutic strategies targeting class B GPCRs in obesity management.

Eric Le

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Eric completed his Bachelor's of Pharmaceutical Science Advanced (Honours) from Monash University in 2022. Under the supervision of A/Prof Nicholas Veldhuis, his honours research focussed on developing a BRET assay to assess peptide effect on Neurokinin-1 Receptor conformational states. Eric then worked as a research assistant before starting his PhD in 2023, with his project titled spatiotemporal temporal and spatial dynamics of SSTR2 and SSTR4 signalling, under the supervision of A/Prof Nicholas Veldhuis, A/Prof Michelle Halls, A/Prof Daniel Poole and Dr Mikey Whittaker.

Temporal and spatial dynamics of SSTR2 and SSTR4 signalling

Introduction:

G protein-coupled receptors (GPCRs) can signal not only from the plasma membrane but also from intracellular compartments following internalisation, producing distinct physiological effects. Somatostatin receptors (SSTRs), traditionally linked to endocrine processes, are increasingly recognised for subtype-specific roles in cancer progression and nociception. SSTR2 is a key target in neuroendocrine tumours, while SSTR4 is emerging as a promising target for non-opioid pain therapies. Despite their relevance, few studies have explored how these receptors are organised and trafficked within cells, or whether internalised receptors remain functionally active.

Aim:

To map the subcellular localisation of SSTR2 and SSTR4 and determine how receptor location affects G protein coupling and downstream signalling in response to endogenous and synthetic ligands.

Methods:

Bioluminescence resonance energy transfer (BRET) biosensors and confocal imaging were used to assess receptor localisation. G protein and β-arrestin coupling was quantified using BRET, and cAMP inhibition was measured with the CAMYEN biosensor.

Results:

Preliminary findings revealed distinct trafficking and signalling profiles. SSTR2 rapidly internalised to Rab5a following activation with 1 μM SST-14 (1.874 ± 0.149, n=6), while SSTR4 remained mostly at the plasma membrane (0.051 ± 0.008, n=6, $P < 0.001$). Kinetic analysis showed SSTR2 elicited a rapid, transient peak in mini-Gs/i-venus recruitment, whereas SSTR4 induced a slower, sustained response. The receptors' relative ability to activate signalling in different compartments was quantified.

Conclusion:

These findings provide insight into SSTR subcellular localisation, trafficking, and functional capacity. Understanding how receptor location influences signalling can guide the development of more selective therapeutic strategies.

Freda Jong Jia Xin

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Freda Jong is a PhD candidate at Monash University Malaysia, researching burnout and workplace wellbeing among pharmacists in collaboration with the Ministry of Health Malaysia. She holds a Master of Science in Psychology (Research) and has developed a strong foundation in mindfulness-based digital interventions, having created a mindfulness mobile app to support emerging adults transitioning out of university. Before commencing her PhD, she served as a research assistant at Monash University Malaysia, contributing to systematic reviews and meta-analysis, randomized controlled trials, and qualitative studies. Her publications span mindfulness, yoga, and cognition, with broader interests in mental health, complementary therapies, and occupational wellbeing.

Understanding The Contributing Factors and Impact of Burnout on Malaysian Pharmacists in Their Respective Healthcare Organisations (Government and Private)

Burnout has become a growing occupational concern among healthcare professionals, yet evidence on pharmacists, particularly within Malaysia's dual public-private health system, remains limited. Guided by the Job Demands–Resources (JD-R) framework, the first

phase of this project employed a qualitative design involving 86 semi-structured interviews with pharmacists across public hospitals, health clinics, and community and private sectors. Reflexive thematic analysis revealed four overarching themes: (1) "Constrained professional identity and recognition within the healthcare system", highlighting structural barriers affecting pharmacists' perceived limited decision-making autonomy; (2) "Mismatches between individual and organizational expectations for career growth", reflecting tensions between pharmacists' aspirations for meaningful work and profit- or hierarchy-driven career trajectories; (3) "Safe and supportive work environments in fostering teamwork", emphasizing the protective role of peer and managerial support versus the detrimental impact of toxic leadership; and (4) "Resilience and proactive strategies in managing burnout", underscoring resources that sustain engagement. These findings extend the JD-R model by illustrating how job demands (e.g., role stress, workload, toxic leadership), resources (e.g., recognition, workplace support, resilience), alongside contextual factors such as person–organization fit and proactive recovery behaviours, jointly impact pharmacists' burnout and work engagement. As part of a larger multi-pronged research design, this qualitative phase informs (i) a national cross-sectional survey to quantify burnout and validate psychosocial constructs, and (ii) an economic model estimating direct, indirect, and productivity-related costs, including productivity-adjusted life-years (PALY) loss. Collectively, this program aims to inform policies that strengthen pharmacist well-being and sustainable healthcare delivery in Malaysia.

Hannah Middleton

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Hannah Middleton is a third-year PhD student in the Medicinal Chemistry Theme under the supervision of Professor Bernard Flynn. Her research focuses on drug development, targeting sphingolipid signalling to treat metabolic diseases during her PhD, before shifting to investigate directed drug delivery through catalytic prodrug activation. Hannah did a Bachelor's degree in Pharmaceutical Sciences at Monash University before completing her Honours year at MIPS in 2022, also under the supervision of Professor Bernard Flynn.

Targeting Sphingolipid Signalling in Metabolic Disease

Metabolic dysfunction-associated steatotic liver disease (MASLD) is characterised by the accumulation of fat in the liver (steatosis), which can progress to metabolic dysfunction-associated steatohepatitis (MASH), irreversible liver cirrhosis leading to liver failure, and sometimes hepatocellular carcinoma. The absence of efficacious pharmaceutical interventions for MASLD/MASH has prompted the exploration of novel targets. Elevated ceramide levels have been implicated in the progression of MAFLD/MASH. Whilst ceramide production occurs through several pathways, the two most relevant are the de novo sphingolipid pathway and the salvage pathway. Consequently, targeting enzymes such as dihydroceramide desaturase 1 (Des1) and acid sphingomyelinase (ASMase), presents as a rational approach to addressing MAFLD/MASH. A known ASMase inhibitor, was also identified by us to be a Des1 inhibitor with anti-steatotic effects, and therefore was the basis for an initial structure-activity relationship (SAR) exploration. The study investigated compounds with metal-binding headgroups, such as hydroxamic acids and hydroxyamidines, based on the metal ions present in Des1 and ASMase catalytic sites. While several compounds showed anti-steatotic and Des1 inhibitory effects, no correlation between the two was found, suggesting the compounds likely act on an unknown target. Further SAR analysis revealed that non-metal-binding headgroups, such as amides, were equally effective in reducing lipids and minimised promiscuity, suggesting that metal binding is not necessary for the lipid-lowering effect. This work has identified a series of promising drug leads which will continue to be explored, alongside efforts to determine the lipid-lowering mechanism.

Jackson Kos

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Jackson received a Bachelor's of Pharmaceutical Science (Advanced Honours) from Monash University in 2021. He commenced his doctoral studies in 2022 within the Endocrine and Neuropharmarcology Laboratory, Department of Drug Discovery Biology, supervised by A/Prof Gregory, Dr Hellyer and Dr Langiu. Jackson uses diverse pharmacological and rodent behavioural techniques to investigate the complex landscape of mGlu5 signaling within the context of neurodegenerative and neuropsychiatric disorders.

Exploring sex differences in metabotropic glutamate receptor 5 negative allosteric modulators

Metabotropic glutamate receptor 5 (mGlu5) is a G-protein coupled receptor widely expressed throughout the CNS. Inhibiting mGlu5 function with negative allosteric modulators (NAMs) is a promising therapeutic strategy to treat various neurodegenerative and neuropsychiatric disorders. However, recent evidence suggests sex influences preclinical efficacy. Therefore, we aimed to explore sex differences in mGlu5 NAM pharmacology in vitro, and safety and efficacy in vivo. The pharmacology of two clinically relevant mGlu5 NAMs (fenobam, basimglurant) were examined using iCa2+ mobilisation assays, conducted in single-sex primary mouse cortical and hippocampal neuron cultures. Affinity and cooperativity estimates were quantified using the operational model of allosterism. Safety and efficacy of fenobam (3-30 mg/kg p.o) and basimglurant (0.01-1 mg/kg p.o) were evaluated for behavioural and physiological effects - stimulant-mediated hyperlocomotion, fear conditioning and stress-induced hyperthermia - in male and female C57Bl6/J mice aged 12-14 weeks. In iCa2+ mobilisation assays, mGlu5 NAM pharmacology differs depending on sex and cell type. Fenobam and basimglurant affinity estimates were significantly higher in male hippocampal versus cortical neurons and female hippocampal neurons, with fenobam affinity also being higher in female hippocampal versus cortical neurons. Fenobam and basimglurant also demonstrate distinct safety and efficacy profiles in vivo. Fenobam potentiates stimulant-mediated hyperactivity in females and perturbs conditioned freezing in males, whereas basimglurant had no effect in either sex. Both drugs potentiate stress-induced hyperthermia in males only. This study provides a basis to rationalise sex differences in preclinical data, potentially revealing insights into distinct clinical profiles of mGlu5 NAMs.

Kenta Ishii

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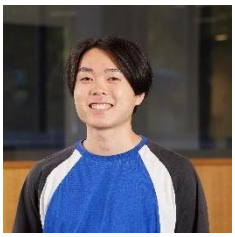

Kenta is a third-year PhD student in the Drug Discovery Biology theme, primarily supervised by Professor Denise Wootten, with additional guidance from his co-supervisors. His research focuses on understanding the structure and dynamics of receptors involved in metabolic processes, using advanced structural biology techniques such as cryo-electron microscopy and hydrogen–deuterium exchange mass spectrometry. Through this work, he aims to uncover molecular mechanisms that could lead to more effective treatments. Outside the lab, Kenta enjoys spending time outdoors and playing soccer..

Integrating Structural and Dynamic Perspectives to Understand a Next-Gen Obesity Drug

Obesity is one of the greatest health challenges our time, affecting approximately 1 in 8 adults worldwide. It is a major driver of comorbidities, including type 2 diabetes, cardiovascular and kidney issues, fatty liver disease. Among available therapeutics, glucagon-like peptide 1 receptor agonists (GLP-1RAs) have emerged as leading options due to their superior weight loss efficacy, metabolic benefits, and safety. The next generation of GLP-1RAs extends beyond GLP-1R agonism. For example, retatrutide, a tri-agonist of GLP-1R, the glucose dependent insulinotropic polypeptide receptor (GIPR) and the glucagon receptor (GCGR) has demonstrated unprecedented weight loss in clinical trials.

Here, we present three cryo-EM structures of retatrutide bound to GLP-1R, GIPR, and GCGR in complex with Gs, providing atomic-level insights int its binding mode. Using 3D variability analysis (3DVA), we further characterize conformational heterogeneity within cryo-EM datasets, and compare these findings with structures bound to native peptides (GLP-1, GIP, GCG) as well as semaglutide, the current gold-standard GLP-1RA.

Finally, we complement the cryo-EM structures with hydrogen-deuterium exchange mass spectrometry (HDX-MS), enabling quantitative assessment of protein flexibility and stability. Through this integrative approach, we identify key differences in receptor dynamics across peptide-bound complexes, providing a more comprehensive understanding of how retatrutide achieves its tri-agonist action.

Lailaturrahmi

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Lailaturrahmi is a pharmacist and a pharmacy academic from Indonesia. Her research project explores how clinical skills could be taught online in the Indonesian context, which will focus on stakeholders' expectations and needs, design, implementation, and outcomes.
stakeholders. Her presentation in this symposium covers the design and implementation of MyDispense to teach therapeutic decision-making skills in Indonesia.

Teaching clinical skills with MyDispense: Insights from an Indonesian university

Online simulations like MyDispense offer pharmacy students opportunities to develop clinical skills, including therapeutic decision-making, beyond traditional classroom settings. However, their design and implementation in the Indonesian context remain underexplored. This study evaluates a MyDispense-based online module aimed at teaching therapeutic decision-making to third-year pharmacy students at an Indonesian university, using an explanatory sequential design.

Student perceptions were gathered through a feedback survey and follow-up interviews, both developed using the Community of Inquiry (CoI) framework. The survey and interview questions were translated into Indonesian, reviewed by two experts, and pilot-tested with final-year students to ensure clarity and accuracy.

Descriptive analysis of survey responses and thematic analysis of interview transcripts (ongoing) were conducted using the CoI framework. Twenty-six students completed the module and survey; 19 participated in interviews. Most students identified teaching presence through clear objectives (92%) and instructions (81%), social presence via group discussions (85%), and cognitive presence through intellectual stimulation (85%) and transferability to other learning environments (81%).

Findings suggest successful integration of teaching, cognitive, and social presences in the module. The CoI framework proved effective for evaluating and guiding online module design and implementation, offering insights for future improvements. Interview analysis will be presented at the symposium.

Pranav Runwal

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Embarking on a collaborative PhD journey at Monash University and WEHI, my project focuses on engineering nanobodies to overcome the blood-brain barrier in glioblastoma, a highly aggressive brain cancer with a 5-year survival rate of only 5%. Under the mentorship of Professor Joseph Nicolazzo, my academic journey began with an in-depth exploration of blood-brain barrier dynamics.

Using nanobodies to facilitate drug delivery across the blood-brain barrier in gliomas

Glioblastoma multiforme (GBM), a highly malignant brain cancer, poses significant challenges in oncology, with a stark 1% drug development success rate over two decades.1 Its treatment is hindered by the blood-brain barrier (BBB), which restricts drug penetration due to tight junctions and efflux transporters.2 To address this challenge, leveraging receptor-mediated transcytosis (RMT) by targeting the transferrin-1 receptor (TfR1) is being explored. 3 Nanobodies, small and stable derivatives of camelid antibodies, are ideal for blood-brain barrier (BBB) crossing due to their increased stability, aqueous solubility and unique epitope recognition capabilities relative to conventional antibodies. 4,5 This project focuses on developing nanobody-drug conjugates leveraging RMT for efficient anti-cancer drug delivery to GBM sites, addressing the critical challenge of drug resistance in brain tumors. Nanobodies targeting human TfR1 have been identified by Watson, G.M and Jayakrishnan N (Unpublished data), aimed at enhancing drug delivery across the BBB. These nanobodies were expressed and purified using a bacterial expression system, followed by size exclusion chromatography to isolate pure, monomeric fractions. A key step involved fluorescently labelling the nanobodies with Alexa Fluor 647 (AF-647) at a 1:1 molar ratio, achieved through ion exchange chromatography. This precise labelling is vital for preserving the affinity of the nanobodies' to TfR1 affinity and for their visualization and tracking during cell binding, internalization, and transport studies. Bio-layer Interferometry (BLI) results have demonstrated that the AF-647 labelled nanobodies maintain TfR1 binding properties, with affinities between 0.2 nM to 49 nM, and some exhibiting cross-reactivity to mouse TfR1. To mitigate potential off-target effects such as disrupted iron transport due to transferrin (Tf) competition, BLI was employed to assess the competition between the nanobody and Tf for TfR1 binding. BLI results demonstrate that 6 out of 8 nanobodies do not interfere with the binding of Tf to TfR1, thus suggesting that these 6 nanobodies will not interfere with physiological iron transport. Future steps include a flow-cytometry-based competition assay to further refine nanobody selection. Subsequent experiments will assess these nanobodies for their binding, internalization, and BBB transport capabilities using the hCMEC/D3 cell line, a clinically relevant model of the BBB. This research highlights the potential of nanobodies in targeted drug delivery for brain cancer treatment, demonstrating their capability to overcome BBB-related drug delivery barriers.

Qianying Chen

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Qianying Chen is currently 2nd year PhD student at D4. She worked with iron oxide nanoparticles for cancer diagnosis and treatment during her Master studies. Now, her research focuses on the biomolecular corona of lipid nanoparticles. She is looking forward to an insightful discussion and feedback during the symposium.

Does the structure of lipid mesophase nanoparticles affect their digestion?

INTRODUCTION

Lipid mesophase nanoparticles (LMPs) are widely studied for enhancing the solubility and bioavailability of poorly soluble drugs. In the GI tract, digestible lipids in LMPs are hydrolyzed by lipases, leading to structural changes that affect drug release and absorption (1,3). Thus, understanding the digestion kinetics of LMPs with varying structures is crucial for optimizing drug delivery.

METHODS

Four lipid mesophase nanoparticles (LMPs) with different structures were synthesized using glycerol monooleate (GMO), hexadecane, and Pluronic F127, verified by small-angle X-ray scattering (SAXS). The in vitro digestion was monitored by high-performance liquid chromatography (HPLC). The interaction of lipases and LMPs was investigated with small-angle neutron scattering (SANS).

RESULTS AND DISCUSSION

LMPs with the initial V2 (Im3m) phase showed the fastest production rate of oleic acid at the start of digestion, indicating the quickest digestion rate. This is consistent with the previous report that the hydrolysis rate of cubic phases was generally faster than the H2 phase (2). Furthermore, the underlying mechanism for the enhanced hydrolysis rate was explored. The V2 phase, characterized by open water channels, allowed lipases to enter the LMPs, thereby increasing the formation of GMO–lipase complexes essential for

digestion. In contrast, the other three LMPs lacked such open channels, which restricted enzyme–substrate interactions. This was supported by the presence of a lipase-related bump observed in the SANS scattering pattern.

Thu Hang Nguyen

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Thu Hang Nguyen is a first year PhD student at the Centre for Medicine Use and Safety. Her research focuses on demographic characteristic differences in the use of glucose-lowering medications in patients with type 2 diabetes, using Australia population-based cohorts to inform precision medicine and promote equitable healthcare delivery. Prior to her doctoral studies, she completed a Master of Research in Pharmacology and Clinical Pharmacy and a Bachelor of Pharmacy at Hanoi University of Pharmacy, Vietnam. Her previous research examined therapeutic management in cardiovascular and respiratory diseases. She is committed to advancing pharmacoepidemiology research in type 2 diabetes.

Treatment patterns and predictors of Second-line Glucose-Lowering Therapy in Adults withType 2 Diabetes in Australia

Abstract

Type 2 diabetes(T2D) pharmacotherapy has evolved with the introduction of sodium-glucose cotransporter 2 inhibitors (SGLT2 inhibitors) and glucagon-like peptide-1 receptor agonists (GLP-1 RA), recommended for their cardiovascular and renal benefits. However, patterns of second-line therapy and factors influencing treatment selection in Australia remained unexamined.

Aims

To describe second-line glucose-lowering drug (GLD) use following metformin, identify predictors of treatment selection, and examine temporal changes from 2013 and 2024.

Materials and Methods

Using a 10% sample of the Pharmaceutical Benefits Scheme, we identified 73,224 T2D people with T2D initiating second-line therapy after metformin. Incidence of therapy initiation was estimated, and risk ratios (RRs) for second-line GLDs initiation were calculated according to age, sex, concession and prior cardiovascular drug use. Treatment transitions before and after 2020 were visualised with the Sankey diagram.

Results

Over 10 years, DPP-4 inhibitors (n=25,581, 34.94%) and SGLT2 inhibitors (n=14,318, 20.11%) were the most frequent second-line therapies. DPP-4 inhibitors and SUs were more frequently used in older adults, while GLP-1 RA and insulin were more common in females and younger patients. Prior ACE inhibitors/ARB use was associated with higher likelihood of receiving SGLT-2i (RR=1.18, [95%CI, 1.12-1.25]) or GLP-1 RA (RR=1.18, [95%CI, 1.14-1.23]). After 2020, use of SGLT2 inhibitors and GLP-1 RA increased, replacing DPP-4 inhibitors and SUs, and later-line regimes became more diverse with greater dual and triple therapy use.

Conclusions

Second-line T2D treatment in Australia has shifted toward newer, evidence-based therapies, replacing traditional GLDs and supporting more individualized care.

Poster Presentation

Bhavika Rana

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Bhavika is 3rd year Ph.D. student at ARC Industrial Transformation Training Centre for Cryo-electron Microscopy of Membrane Proteins (CCeMMP), Monash University. Her research focuses on understanding ligand selectivity and allosteric modulation of Muscarinic acetylcholine receptors (mAChRs) using cryo-electron microscopy. With a background in molecular pharmacology and structural biology, she aims to bridge mechanistic insights from structural data with therapeutic innovation in central nervous system disorders.

Structural and pharmacological validation of allosteric sites at the M5 Muscarinic acetylcholine receptor – a target for CNS disorders

G protein-coupled receptors (GPCRs) are preeminent drug targets accounting for a third of approved medicines. Despite this success, the discovery of new drugs that selectively target GPCRs has been a challenge due to many GPCRs being activated by similar types of ligands. It is now well-appreciated that GPCRs contain allosteric sites, which are binding sites that are distinct, but conformationally linked to the endogenous/orthosteric binding site. A key feature of allosteric modulators is their capacity to specifically bind to one GPCR subtype due to allosteric sites being less conserved. This ability allows them to circumvent the challenge associated with targeting the conserved orthosteric-binding site found on closely related receptors. The muscarinic acetylcholine receptors (mAChRs) are a five-membered (M1-M5) subfamily of Class A GPCRs that are an exemplary example of therapeutically relevant GPCRs that can be selectively targeted by allosteric ligands. The mAChR subtypes play a critical role in neurological functioning, and M5R knockout mice suggest a physiological role in CNS disorders. Although there is strong data supporting the M5 mAChR as a potential therapeutic target, further clinical research has been hindered due to a lack of selective drug-like molecules for the receptor. Thus, researchers have focused on finding allosteric ligands that selectivity modulate the M5 mAChR. Here, we report a 2.6 Å cryo-EM structure of the human M5 mAChR bound to acetylcholine (ACh) and a distinct positive allosteric modulator ML129 (Isatin PAM). ML129 covalently interacts with cysteine residue (Cys 214 5.59) at a previously unidentified allosteric site in TM5. Further analysis revealed that this compound also interacts with another cysteine residue (Cys 484 7.42) in TM7, though the electron density for this interaction is less well-defined. Moreover, we believe that ML129 forms a transient interaction with two cysteine in TM7: one is the previously mentioned C4847.42 and another one is C4947.52. Further to validate this site, we designed alanine point mutations of key interacting cysteine's. Our previous study with a different PAM, VU6007678, revealed an intracellular allosteric site located at the receptor–lipid interface, interacting with key activation motifs. In contrast, the structurally distinct ML129 binds to a separate region of the receptor, highlighting the structural and topological diversity of allosteric modulation at the M5 mAChR. Overall, our study has identified a new mAChR allosteric site that may be useful for the design of selective allosteric modulators.

Emily Mannix

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Emily Mannix is a first-year PhD candidate at the Faculty of Pharmacy and Pharmaceutical Sciences, Monash University. Working within the Pharmacometrics research group led by Professor Carl Kirkpatrick at the Centre for Medicine Use and Safety, Emily's work explores the emerging methodology of 'Virtual Twins' in Physiologically-Based Pharmacokinetics (PBPK) modelling and simulation. Drawing on her background as a clinical pharmacist, Emily's research lies at the interface of quantitative modelling and clinical decision-making, with a focus on personalising pharmacotherapy to enhance medication safety, optimise therapeutic outcomes, and advance precision medicine in real-world settings.

The use of Virtual Twins in physiologically-based pharmacokinetics: A perspective review

Whilst physiologically-based pharmacokinetic (PBPK) models have a significant history supporting the exploration of pharmacokinetic variability at the population level, the application of Virtual Twins (VTs) presents the opportunity to further therapeutic optimisation through personalisation to the individual. This review aims to collate and analyse existing research using VTs in PBPK to understand the prevalence and diversity of use, compare methodologies, and identify opportunities for advancement of VTs. A literature search was conducted to identify studies virtual twinning a whole human body for the purpose of predicting drug concentration/effect. Details

of the VT-PBPK models and design were extracted from each study and verified by a second reviewer. A framework assessing each study's method of simulation and virtualisation was applied to the extracted data. Eighteen studies were included in this review. Results highlight the application of virtual twinning across a range of populations, disease states and drug classes, for the purpose of PBPK model development and evaluation, and model-informed precision dosing (MIPD). All studies applied virtual twinning to real-world data (RWD) retrospectively. In the VT approaches, there are at least three levels of virtualisation; low, medium and high, as determined by the number of RWD covariates such as physiological, demographic, and genetic data integrated into the model. Advancement of MIDP-VTs will depend on a shift in application of PBPK modelling and simulation from producing population-based to specific, individualised predictions. As such, there is a sizeable step required in evaluating VT models and amassing evidence of success before prospective clinical implementation is achievable.

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Imesha obtained a BSc (Honours) in Chemistry from the University of Sri Jayewardenepura, Sri Lanka, and a Graduateship in Chemistry from the Institute of Chemistry Ceylon. Driven by a strong passion for drug discovery, she commenced her PhD in Medicinal Chemistry at the Monash Institute of Pharmaceutical Sciences (MIPS) in 2022, under the supervision of Prof. Martin Scanlon and A/Prof. Ben Capuano. Her research focuses on developing novel chemical tools to investigate the biological function of fatty acid-binding protein 4 (FABP4) through fragment-based drug design, with the goal of advancing understanding in therapeutic target validation.

DEVELOPING NEW CHEMICAL TOOLS TO UNDERSTAND THE BIOLOGY OF FATTY ACID BINDING PROTEIN 4

Fatty acid-binding proteins (FABPs) are a family of small, soluble proteins involved in lipid transport, hormone signalling, and drug disposition. They also play crucial roles in cellular signalling and have been implicated in diseases associated with disrupted lipid metabolism. Among them, FABP4 is highly expressed in adipocytes and macrophages. Mouse knockout studies have shown that loss of FABP4 function can ameliorate inflammatory conditions such as diabetes and atherosclerosis, establishing it as a promising therapeutic target for metabolic disorders. However, the molecular mechanisms by which FABP4 contributes to disease progression remain incompletely understood.

Existing high-affinity FABP4 ligands often exhibit poor physicochemical properties, including excessive lipophilicity, low solubility, and non-specific binding, limiting their use as chemical probes. This project aims to develop selective, high-affinity FABP4 ligands with improved drug-like properties. A fragment-based screen identified a novel biaryl N-phenylimidazole scaffold (MFP-0000962) as a binder to FABP4. Guided by microscale parallel synthesis, a library of analogues was generated and their binding kinetics assessed via off-rate screening by Surface Plasmon Resonance (SPR). Systematic exploration of the three-dimensional chemical space around the fragment core enabled identification of improved analogues.

The most promising compounds were further characterised using biophysical methods, including SPR, Isothermal Titration Calorimetry (ITC), NMR, and X-ray crystallography. In particular, crystallographic data provide a platform for structure-based drug design (SBDD), enabling rational optimisation of binding affinity and selectivity. Collectively, these studies advance the development of chemical tools to probe FABP4 biology and support its validation as a therapeutic target.

Jia Li

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Jia Li is a PhD candidate at the Centre for Medicine Use and Safety, Monash University. Her research focuses on model-informed drug development of anakinra in preterm neonates, including population pharmacokinetic (PPK), physiologically based pharmacokinetic (PBPK), and pharmacokinetic/ pharmacodynamic (PPK/PD) modelling approaches. Her work integrates the unique physiological characteristics of premature neonates to optimize dosing strategies and support clinical development. Jia holds a Bachelor's degree in Pharmacy and a Master's degree in Medicinal Chemistry. She has diverse experience across academia and the pharmaceutical industry, including roles as a manager coordinating preclinical and clinical studies in autoimmunology and oncology.

Dose Optimisation of Anakinra in Preterm Neonates using Mechanistic Population Pharmacokinetic Approaches

Introduction. Anakinra, an interleukin-1 receptor antagonist, is a promising candidate for use in preterm neonates to prevent or treat inflammation-driven morbidities, including bronchopulmonary dysplasia and diffuse white matter injury. However, the pharmacokinetics (PK) of anakinra have never been characterized in preterm neonates, who undergo rapid physiological changes in organ size, perfusion & function, limiting evidence-based treatment.

Aims. To develop a population PK model of anakinra in preterm neonates to inform optimal dosing strategies, accounting for age-related physiological changes.

Methods. A population PK model using a nonlinear mixed-effect model was developed from blood concentration, clinical and demographic data collected in the Anakinra Pilot trial (NCT05280340). In this Phase I/IIa trial, anakinra was administered intravenously across a 21-day period to preterm neonates (24-28 weeks gestational age). An optimal dosing regimen was then developed using simulations from the final covariate model, which incorporated a direct effect model (Emax, IC50) for efficacy, and target exposure (AUC0-24h) range for efficacy and safety (Figure 1).

Results. A one-compartment model with linear elimination incorporating a baseline model for endogenous IL-1Ra concentrations best described the data. Allometric scaling applied to clearance (CL) and volume of distribution (V), with maturation included on CL. The optimal dosing regimen for efficacy and safety was identified via simulations

Discussion. The population PK model for anakinra provides a critical understanding of small therapeutic protein PK in premature neonates, as well as a dosing strategy to guide further Phase II and III clinical trials.

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Jiayan He is a third-year PhD candidate at the Monash Institute of Pharmaceutical Sciences (MIPS), within the Drug Delivery, Disposition, and Dynamics (D4) theme. Her research focuses on the therapeutic potential and immunomodulatory mechanisms of an intestinal lymph–targeted celecoxib prodrug for inflammatory bowel disease (IBD), a condition associated with gut lymph dysfunction. Her work aims to advance lymph-targeted drug delivery systems to improve treatment efficacy and quality of life for patients with IBD.

Examining the therapeutic potential and immunomodulatory mechanism of a lymph-targeted celecoxib prodrug in inflammatory bowel disease

Inflammatory Bowel Disease (IBD) is characterized by chronic and remittent gastrointestinal inflammation. In Australia, IBD affects 348 per 100,000 people and poses severe risks, including colorectal cancer, underscoring its substantial clinical and societal burden. Imbalance between anti-inflammatory T regulatory (Treg) cells and pro-inflammatory T helper 17 (Th17) cells, alongside altered mesenteric lymph function, can contribute to the development of IBD. Current treatments have limited efficacy and lack long-term benefits, highlighting the need for novel therapeutics. Celecoxib (Cele) is a potent anti-inflammatory drug, but its use is limited by its gut-associated side effects. We developed a triglyceride-mimetic celecoxib prodrug (Cele-Pro) that specifically accumulates in the intestinal lymphatics, providing direct interaction with local T cells. This strategy enhances drug exposure to immune cells, amplifies local immunomodulatory effects and minimizes gastric toxicity. Cele-Pro alleviated disease burden in models of IBD (DSS-induced and adoptive T cell transfer colitis), evidenced by reduced symptoms, preserved colon integrity, and decreased inflammation. Cele-Pro appeared to decrease pro-inflammatory Th1/Th17 cells and associated cytokines in the colon. MALDI was used to examine the molecule species present in different tissues during absorption. This study holds the promise of advancing an effective IBD treatment by specifically targeting the intestinal lymph leading to multiple long-term benefits, including mucosal repair, targeted resolution of inflammation, minimized systemic toxicity, and prolonged efficacy after oral administration. More importantly, adopting the prodrug strategy could refine the design and development of other medications for IBD and related conditions, leading to a broader field of drug development and pharmacology.

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Jiawen (Yannee) Liu is a first year PhD student from the Centre for Medicine Use and Safety. Yannee's PhD explores the impact of potentially inappropriate medicine use on individuals, society and the environment. Yannee completed her Bachelor of Pharmacy (Honours)/ Master of Pharmacy at Monash University and is a hospital pharmacist.

Trends and costs of potentially inappropriate medications

Background. Potentially inappropriate medications (PIMs) are medicines where the potential for harm outweigh the potential for clinical benefits, particularly when used in older adults.
Aim. To identify trends in utilisation and costs of commonly dispensed PIMs in Australia.
Methods. This is a retrospective analysis of publicly available Pharmaceutical Benefits Scheme (PBS) data. The dataset captures all Australians who received medications dispensed under the PBS from 2014 and 2024. Government and patient costs were extracted. PIMs were defined using the Beers and STOPP criteria.
Results. In 2024, the majority (67%) of medications dispensed via the PBS were to people aged 60 years or older. In 2014, thirteen of the top fifty highest volume PBS medications were considered PIMs. In comparison, eight of the top fifty higher volume medications were categorised as PIMs in 2024. The cumulative cost of these eight PIMs was more than $400 million for the Australian Government and more than $110 million for patients. In 2024, two of the top ten medications dispensed to both older males and females were PIMs. In residential aged care facilities, two of the top ten PBS medications dispensed by highest prescription count are PIMs in 2024. In both years, frequently dispensed PIMs included PPIs, gabapentin, opioids, NSAIDs, benzodiazepines and sulfonylureas.
Conclusion. Nationally, of the top fifty highest volume PBS subsidised medications, 26% are classified as PIMs in 2014, reducing to 16% in 2024. PPIs are the most common PIM. This study demonstrates that PIMs are becoming less prevalent in the top fifty high volume dataset. However, a more detailed analysis of pharmacy claims data is required to assess the trends in utilisation and costs of PIMs in older Australians.

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Karl Vivoda is a PhD student and a practising community pharmacist across multiple locations in Melbourne. He researches pharmaceutical and lifestyle interventions in cardiovascular disease and their effect on productivity. Karl focusses on understanding current practices, implementing guideline driven interventions and delivering patient care in an equitable manner. His research aims to drive policy changes through combining genetics and economics to positively impact patients lives.

A critical systematic review of methodologies and modelling approaches in the treatment of hyperlipidaemia

Introduction:
Health economic modelling is a complex process involving assumptions and extrapolations and is reliant on transparency to be an effective instrument for decision makers for medicine reimbursement. Hyperlipidaemia is a chronic complex condition responsible for a significant portion of the world's morality. This systematic review aims to critic the methods and approaches used by modellers to inform treatments of hyperlipidaemia.
Methods:
A systematic literature search was conducted in MEDLINE and Embase between 1987 and 2025 to identify health economic models examining hyperlipidaemia. Title and abstract screening, data extraction and quality assessment was performed by two people utilising AI software checking and conflict resolution. Findings will be presented through a narrative synthesis. This study is registered in PROSPERO (CRD420251043922).
Results:
Markov models examining primary prevention of hypercholesterolaemia over a lifetime horizon with analysis in Microsoft Excel are commonly built because of their simple to construct nature. Complex patient level microsimulation models are challenging to build, however, are more robust in their design and structure. Models have improved in their quality reporting over time and performance in sensitivity analysis and validation. However, models generally do not adhere to best practices and have the potential to bias results for decision makers and for the patient's therapeutic treatment is intended for.
Conclusion:
Models generally are transparent in assumptions and have a justified structure. Models can be improved by incorporating extensive uncertainty analysis and model validation during development and by transparently and systematically selecting the most appropriate data for evaluation.

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Kelly works under the supervision of A/ Prof. Kristian Kempe and Prof. Jess Frith (MSE) to investigate novel poly(cyclic imino ether) (PCIE) systems for use in drug delivery and tissue regeneration applications. His most recent publication in Polymer Chemistry investigated the hydrophilicity of a set of water-soluble PCIEs, demonstrating their versatility and ease of customisation for specific material properties.

Expanding the toolbox of PEG alternatives – evaluation of the hydrophilicity of poly(cyclic imino ether)s

Poly(cyclic imino ether)s (PCIEs) are a rapidly emerging class of polymers for use in biomedical and therapeutic applications. This suitability stems primarily from their "stealth" or low-fouling behavior, noted to be similar to – or to exceed – that of poly(ethylene glycol) (PEG). Unlike PEG, PCIEs can be readily "tuned" via monomer selection and chain length to achieve a range of physico-chemical properties, with hydrophilicity, for example, being varied between highly water-soluble to water-insoluble; allowing for the smart synthesis of polymers with properties tailored for their application. This study worked to elucidate hydrophilicity trends in a library of water-soluble PCIEs, containing well-characterised poly(2-alkyl-2-oxazoline) (POx) polymers such as poly(2-ethyl-2-oxazoline) (PEtOx) and poly(2-methyl-2-oxazoline) (PMeOx), alongside the comparatively under-studied poly(2-alkyl-2-oxazines) (POz) and poly(2,4-dialkyl-2-oxazolines) (PdOx). A library of 20 water-soluble PCIEs was created utilizing cationic ring opening polymerization of 10 cyclic imino ether monomers, each at two different degrees of polymerization. The hydrophilicity of polymers within this library were assessed using turbidimetry, high-performance liquid chromatography, octanol-water partition coefficient (logKOW), surface tension measurements and 1H NMR relaxometry. From this study, specific hydrophilicity tuning can be attributed to polymer size, polymer side chain length, backbone spacing, and backbone functionality, with general trends following a POz > PdOx > POx trend while comparing between structural isomers, and a POx > POz > PdOx trend when comparing between polymers with the same side chain. Specific hydrophilicity trends were elucidated for a water-soluble PCIE library, with the resulting knowledge aiding in the design of tailored polymers for biomedical and therapeutic applications.

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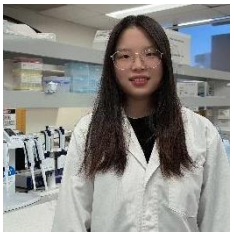

Li is a research-based Master's student in the Medicinal Chemistry theme within the Thompson group, investigating the melanocortin receptor (MCR) family. Her project focuses on characterising novel melanocortin peptides using cell-based and fluorescence-based assays. By exploring how SAR influence potency, selectivity, and binding affinity across different MCR subtypes, her work aims to deepen understanding and support the development of future therapeutic peptides for MCR-related diseases.

Pharmacological Studies of Novel Constrained Melanocortin Peptides

The melanocortin signalling system is a fundamental and complex biological pathway with broad physiological functions and considerable therapeutic potential. It consists of five distinct melanocortin receptor subtypes (MC1R–MC5R), which are activated by four endogenous peptide ligands: α-melanocyte-stimulating hormone (α-MSH), β-MSH, γ-MSH, and adrenocorticotropic hormone (ACTH). These receptors belong to the G protein-coupled receptor (GPCR) family, and they are widely expressed across diverse tissues, including exocrine glands, epidermis, and the central nervous system. MCRs primarily signal through the cyclic adenosine monophosphate (cAMP) pathway. Although each receptor subtype is broadly distributed throughout the body, they exhibit distinct tissue-specific expression patterns. These differences contribute to a wide range of physiological and pathological processes, including skin pigmentation, energy homeostasis, and inflammation. As a result, melanocortin receptors (MCRs) have emerged as promising targets for therapeutic intervention.

The majority of work has examined side-chain to side-chain bridged peptides such as Asp-Lys lactams (MT-II, bremelanotide) and Cys-Cys disulfides (Setmelanotide). Other architectures have been less studied. Here we have assessed novel head-to-tail and head-to-side-chain linked peptides synthesised at the University of Naples. These peptides feature modifications to the ring size and amino group on the lactam bridge. To investigate MCR function, cAMP accumulation assays were used in MCR-transfected HEK cells. To characterise their binding properties, we employed fluorescence-based competitive binding assays (FACS). This allowed us to investigate the relationship between receptor binding affinity and cAMP-mediated functional activity. We found that the structural modifications significantly influenced receptor subtype-specific activity and selectivity with highlight example FM636 showing sub-nanomolar binding affinity and potent, selective antagonism of MC4R.

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Masoud Khazaei is a PhD candidate in Pharmacy and Pharmaceutical Sciences at Monash University, Australia. His research focuses on developing integrated microfluidic electrochemical devices for real-time monitoring of cell health. With a background in Chemical Engineering and extensive experience in nanomaterials synthesis, surface functionalization, and electrochemical biosensing, Masoud has contributed to advancements in biomedical sensing and interfacial engineering. He has published in high-impact journals such as Biosensors and Bioelectronics and Food Chemistry. Masoud currently works as a Technical Assistant at the Melbourne Centre for Nanofabrication, supporting the development of next-generation microfabrication technologies.

Metabolic Fingerprinting of Cell Cultures via Micropillar-Structured Dual Glucose and Lactate Biosensor

Real-time monitoring of cellular metabolism is critical for advancing cell biology, tissue engineering, and bioprocess control. Among various metabolic indicators, glucose (Glu) and L-lactate (LA) offer complementary insights into energy metabolism, cell proliferation, and cellular stress. However, conventional assays require separate, time-consuming measurements that lack temporal resolution and disrupt cell culture environments. Here, we report a miniaturized, label-free electrochemical biosensing platform for continuous, simultaneous monitoring of Glu and LA in mammalian cell cultures without the need for sample dilution or off-line processing, utilizing a micropillar array (MPA)-based microfluidic electrochemical device (MED). The biosensing platform was optimized for reliable performance in cell culture. The MED exhibited a linear range of 0.5–35 mM, a limit of detection (LOD) of 0.18 ± 0.01 mM, and a sensitivity of 0.33 ± 0.02 µA. mM-1 for Glu, and linear range of 0.5–40 mM, LOD of 0.19 ± 0.01 mM, and a sensitivity of 0.267 ± 0.012 µA. mM-1 for LA. The device successfully captured dynamic metabolic shifts associated with cell proliferation, differentiation, and contamination events in murine fibroblast (GP+E86) and human-induced pluripotent stem cell (hiPSC) cultures. This dual-analyte, real-time biosensing platform offers a scalable and non-invasive solution for metabolic profiling in advanced cell culture systems.

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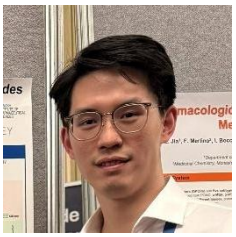

Mindi is a second year PhD candidate from Medicinal Chemistry, Monash Institute of Pharmaceutical Sciences. He completed Honours with A/Prof. David Chalmers and continued his PhD research on orally bioavailable peptides. His research aims to develop passively permeable and biologically active peptides targeting somatostatin receptor 2.

Combinatorial Design of Orally Bioavailable Cyclic Peptides Targeting Somatostatin Receptor 2

Peptide therapeutics hold significant therapeutic promise, potentially offering patients treatments with high potency, selectivity and reduced off-target toxicity. However, the development of peptide therapeutics is hindered by low oral bioavailability. Orally active peptides are required to be membrane permeable, metabolically stable and active towards therapeutical targets1. Of these, membrane permeation remains the limiting factor. The discovery of the orally bioavailable Cyclosporin A (CsA) led to the chameleonic hypothesis, suggesting solvent-dependent backbone conformation allows passive permeation2. However, this hypothesis fails to guide the design of permeable cyclic peptides targeting GPCRs, which often require polar/charged residues.

The somatostatin receptor (SSTR) family are well-studied GPCRs that are modulated by small cyclic peptides3. There are 5 subtypes in this family, SSTR1-5, which are responsible for a diverse range of physiological functions including hormone regulations. Current therapeutics targeting SSTRs are administered via injections4. Patient compliance and comfort can be greatly improved by oral treatments.

In this work, we aim to improve the passive permeability of an active SSTR2 ligand, MK678, to elucidate the structural properties of permeable cyclic peptides targeting GPCRs. To address this, we synthesised combinatorial libraries of MK678 analogues retaining the active pharmacophore (D-Trp-Lys) to SSTR2. These libraries were then screened for passive permeability in Parallel Artificial Membrane Permeability Assay (PAMPA), followed by deconvoluting the sequence by re-synthesising permeable hits as pure peptides. The SSTR2 activity of pure permeable hits was evaluated using Bioluminescence Resonance Energy Transfer assay (BRET) by measuring the dissociation of $G_{\alpha i/o}$ and $G_{\beta/\gamma}$.

Paulo M. Simon

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Paulo M. Simon obtained his BSc in Biochemistry at the California State University, Northridge. He then completed a MSc in Chemistry under the supervision of A/Prof. Wallace Wong in 2022. In 2023, Paulo was awarded a scholarship to pursue a PhD program with Dr Amandeep Kaur, where his research is currently focused on the development of fluorescent array sensing, and super-resolution probes. He is currently the President of Parkville Postgraduate Association.

Fluorescent tools to diagnose dementia

Dementia is the leading cause of death in Australia in 2025, one of the factors involved in the disease is the lack of early diagnostic alternatives to allow for early intervention. One of the biomarkers in dementia, and its relevant disease are amyloids - highly structured, and ordered protein aggregates. Fluorescent molecular rotors are environment sensitive probes that changes their photophysical properties depending on their environment. After screening 16 probes, we have identified 4 probes that can distinguish amyloids involved in the diseases. These probes were immobilised on a glass-bottom well plate, that can be used as a device to discriminate amyloids in solution - providing 86% accuracy of telling amyloids apart from each other.

Phil Adriaan

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Phil Adriaan is a third-year PhD candidate in the Faculty of Medicinal Chemistry at Monash University Parkville, under the supervision of Prof. Philip Thompson in the Thompson Lab. His research focuses on the development of melanocortin receptor ligands designed for use as theranostic agents—compounds that can both diagnose and treat melanoma. His work involves the design, synthesis, and pharmacological evaluation of these compounds, including cAMP and binding assays as well as pharmacokinetic studies.

Development of selective MC1R theranostic

The melanocortin 1 receptor (MC1R) is a an attractive target for theranostic applications in melanoma due to its overexpression on melanocytes. In this study, we explored rational vector design strategies of an MC1R hit peptide. A particular vector analogue modification was well tolerated, preserving high receptor affinity and functional activity in vitro.

Subsequent conjugation with the macrocyclic chelator DOTA allowed for stable coordination with radiometals. Importantly, Gallium-68-labeled conjugates retained potent MC1R binding. We have subsequently tested in vitro affinity and potency in mouse melanoma cell lines and found that the potency and affinity is well mentained.

These findings establish linker strategy for theranostic peptide design and highlight the robustness of the MC1R scaffold for developing next-generation molecular tools in melanoma precision oncology.

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Qingke (Demi) He is a PhD candidate at Centre for Medication Use and Safety. She holds a Bachelor of Pharmacy (Honours, Scholar Program) and Master of Pharmacy from Monash University. Her research examines real-world utilisation and repurposing potential of glucose-lowering drugs in Alzheimer's and Parkinson's disease, using large-scale linked health datasets to explore prescribing patterns, safety, and optimisation of therapy.

Changing Glucose Lowering Drugs Patterns in Australia: General vs Neurodegenerative Populations (2015–2024)

Background:
Managing type 2 diabetes in older adults is complex. Current evidence and guidelines support greater use of newer cardiorenal-protective glucose lowering drugs (GLDs), including sodium glucose cotransporter 2 inhibitors (SGLT2is) and glucagon-like peptide 1 receptor agonists (GLP-1RAs). Yet, real-world GLD utilization patterns in the AD and PD populations remain unclear.
Methods:
We analysed a 10% national dispensing sample (2015-2024). Annual prevalence and incidence were calculated for each non-insulin GLD class across the general population aged 50-99 years, and within the AD and PD cohorts. Prior GLD exposure was evaluated using a 12-month look-back. Log-binomial regression assessed GLD initiation predictors in 2024.
Result:
Across 2015-2024, 196,573 individuals used at least one GLD (AD 8,282; PD 6,216). In the AD cohort, incidence of sulfonylurea and DPP-4 inhibitor use fluctuated without a clear decline, and initiation of these older classes was more likely than in the general cohort after adjustment for age, sex, and comorbidity in 2024. In the PD cohort, SGLT2is and GLP-1RAs showed the largest annual gains in prevalence and the highest likelihood of initiation in 2024. In the AD and general cohorts, approximately one in five SGLT2is and one in ten GLP-1RAs were initiated without prior GLD.
Conclusion:
Use of newer GLDs increased in Australia, with slower uptake in the AD cohort and faster adoption in PD. Utilisation pattern partly misaligned with guidelines and reimbursement policies. These findings suggest earlier, risk-guided use of newer GLDs and investigation of prescribing drivers in the AD and PD populations.

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Rizka Prita Yuliani is a first year PhD candidate at the Centre for Medicine Use and Safety, Faculty of Pharmacy and Pharmaceutical Sciences, Monash University. Her current research focuses on developing Indonesian population norms for paid and unpaid work productivity index and productivity-adjusted life expectancy. Prior to her PhD, she worked on a cost-of-illness study examining direct non-medical and indirect costs among breast cancer patients in Indonesia. Her research interests include health economics, productivity measurement, and the application of economic evidence to support healthcare policy in low- and middle-income countries.

Hidden Costs of Breast Cancer: Direct Non-Medical and Productivity Losses in Indonesia

Objective: This study aimed to explore burden of costs from patients' perspective among breast cancer patients visiting a tertiary hospital in Yogyakarta Province, Indonesia.

Methods: Cross-sectional, descriptive study was conducted from August to October 2024 using interview method to breast cancer patients visiting Dr. Sardjito Hospital in Yogyakarta Province, a tertiary referral hospital. The interview examined direct non-medical cost and indirect cost from patients' perspective based on 3 months recalled.

Result: A total of 125 breast cancer patients participated in this study, with a relatively balanced distribution across cancer stages I to IV. Over the 3-month period, there were total of 1,998 visits, mainly for follow-up (61.42%), followed by chemotherapy (30.18%), radiotherapy (6.79%) and surgery (1.61%). The mean cost per visit for direct non-medical costs was IDR 183,965 ($11.61 (95% CI: 11.01–12.22)), contributing 64.60% of the total cost, while the mean indirect cost using human capitel approach was IDR 100,990 ($6.38 (95% CI: 6.09–6.66)), contributing 35.40%. Higher direct non-medical costs were observed among patients living farther from the hospital (p=0.000). Indirect costs were higher among younger (p=0.002) and permanent worker (p=0.004).

Conclusion: This study highlights the substantial economic burden faced by breast cancer patients. Policy interventions should focus on improving transportation assistance, providing financial aid for caregivers, enhancing early detection programs, and exploring decentralized treatment models to reduce hospital visit frequency.

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Sam is a PhD student in the Centre for Medicine Use and Safety at Monash University. Sam holds a Bachelor of Science, and a Master of Pharmaceutical Science from Monash University. Sam's research focuses on the identification and validation of computable phenotypes in pharmacoepidemiologic research, to enable reproducible research on the safety and efficacy of medications in novel populations.

Using Pharmaceutical Benefits Scheme claims to identify and investigate gender affirming hormone therapy

Introduction: In Australia, gender affirming hormone therapy (GAHT) is largely subsidised through the Pharmaceutical Benefits Scheme (PBS). The identification of GAHT use in PBS claims may provide insights into the real-world use of GAHT; and be leveraged to research GAHT-related outcomes.

Methods: A 10% sample of subsidised prescriptions from the PBS was used from 2012-2024 to identify GAHT users aged 12+. GAHT initiation was defined as the first use of testosterone or oestradiol that was either: 1. incongruent with recorded gender marker; or 2. congruent with the latest recorded gender marker, if that marker had changed. Users were grouped into 'assigned female at birth' (AFAB) and 'assigned male at birth' (AMAB), and treatment regimens were characterized and visualised. An interrupted time series analysis was performed by fitting a Prais-Winsten regression onto monthly rates of antidepressant use for one year before and after GAHT initiation.

Results: 2495 GAHT users were identified (1470 AMAB; 1025 AFAB), with a median age of 24 years at initiation. 80.5% of AMABs (n=1184) had used $\geqslant$1 anti-androgen (spironolactone or cyproterone acetate). Most AMABs had three regimens, typically starting with estradiol tablets and an anti-androgen. Spironolactone was more common in the first regimen, while cyproterone was more common in the last. In contrast, most AFABs had one regimen, most commonly testosterone undecanoate. Prior to GAHT initiation, an increasing trend was observed in antidepressant use (0.29%,95% CI[0.20%,0.38%]). Following initiation, this trend declined to 0.07% (-0.22%,95% CI[-0.35%,-0.10%]).

Conclusion: GAHT was identifiable in the PBS, with the younger sample and high anti-androgen use in AMABs supporting selection accuracy. In AFABs, the long-acting formulation of testosterone was most common; while in AMABs treatment regimens were more complex, reflecting more treatment choices. Overall, GAHT initiation largely reversed the rising trend in antidepressant use, suggesting improved psychosocial outcomes.

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I am a clinical pharmacist by profession, with a passion to advancing research and education in the field of antimicrobial stewardship (AMS) in the undergraduate space. Considering the global threat that antimicrobial resistance poses, I believe it is the responsibility of all healthcare professionals, including doctors, pharmacists and nurses, to optimise the safe and effective use of antimicrobials. My PhD research explores how AMS education can be enhanced in the disciplines of medicine, pharmacy and nursing so that undergraduate students are better equipped to practise AMS before they enter the workforce.

Which antimicrobial stewardship interventions do pharmacy students resonate with the most?

Introduction
The World Health Organisation (WHO) has declared antimicrobial resistance as a global public health threat, and constantly advocates for antimicrobial stewardship (AMS) interventions. Pharmacists play a pivotal role in safeguarding antimicrobial use and optimising AMS within multidisciplinary teams.

Aims
The study assessed the AMS knowledge of undergraduate pharmacy students, with a view to inform future curricula to better position pharmacists to implement AMS interventions in the workforce.

Methods
Following the conclusion of an infectious diseases academic unit, pharmacy students at both Australia and Malaysia campuses completed a post-unit reflection. The responses were analysed using summative content analysis and mapped to the WHO AMS interventions practical guide, which describes 10 commonly used stewardship interventions ('themes').

Results
Students overall resonated with themes that are applicable prior to or at the time of prescribing more than those applicable after prescribing. Out of 610 Australian-based students and 181 Malaysian-based students, 61.6% and 33.7%, respectively, felt confident to intervene when antimicrobial prescribing is not optimal. The two themes students resonated with the most were Clinician education and Self-directed antibiotic reassessments (antibiotic timeouts). In contrast, the two least represented themes were Prior authorization of restricted antimicrobials and De-labelling of spurious antibiotic allergies.

Conclusions
Reflection responses demonstrated that pharmacy students do feel confident to intervene when antimicrobial prescribing is inappropriate, and resonate with their role being most impactful at the pre-prescribing time point, especially through clinical education. Further incorporation of content related to obtaining approval prior to prescribing restricted antimicrobials and de-labelling of allergies into the curriculum is encouraged, as these interventions were generally underrepresented by students.

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Subindra Kazi Thapa holds a Bachelor's in Pharmaceutical Sciences and a Master's in Pharmacy. He has over five years of experience in the pharmaceutical industry, focusing on the formulation of various dosage forms. He is currently pursuing a PhD in pharmacometrics, investigating how ageing and polypharmacy affect frailty progression. His research develops pharmacokinetic and pharmacodynamic models to describe interactions between physiological changes, drug effects, and disease progression in older populations. His work aims to strengthen quantitative modelling to optimize the safe and effective use of medications in vulnerable populations.

Applying the Bradford Hill Criteria to Assess the Independent Causal Roles of Ageing and Polypharmacy in Frailty Progression: A Systematic Review

Background:
The scientific literature, including systematic reviews and meta-analyses, has frequently described associations between ageing, polypharmacy, and frailty, without evaluation of their independent causation. The Bradford Hill Criteria, a framework consisting of nine principles for assessing epidemiological causation, is ideally suited to unconfound and assess the independent causal effect of ageing vs polypharmacy, in frailty progression.

Methods:
A systematic review was conducted using PRISMA guidelines across MEDLINE, EMBASE, and CENTRAL, with no limits on date or study design. Studies meeting predefined criteria were appraised using the Joanna Briggs Institute tool. Meta-analyses were performed in RStudio, adjusting for age and polypharmacy to reduce confounding. Causality was assessed using the Bradford Hill Criteria.

Results:
Data from 105 moderate to high-quality studies were synthesized. Eight of nine Bradford Hill principles supported independent causal links between ageing, polypharmacy, and frailty. Strength of association, consistency, and biological gradient were evident, with frailty increasing alongside age and medication count. Temporality was addressed as ageing and medication exposure often preceded frailty, while interventions reducing medication supported the experiment criterion. Biological plausibility, coherence, and analogy were reinforced by mechanisms and epidemiological patterns. Specificity was limited due to frailty's multifactorial nature.

Conclusions:
Findings support independent causal relationships between ageing and frailty, and between polypharmacy and frailty. In the absence of robust RCTs in older populations, this framework provides valuable insight and a foundation for future research into frailty progression.

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Thai Duong Pham is a PhD candidate and pharmacist, who has a general research interest in advancing education through the integration of Generative AI, focusing on its potential to support self-directed learning by fostering student autonomy and enhancing knowledge acquisition. His studies investigates how Generative AI tools enable students to take control of their learning and achieve academic success, along with impacts on motivation, metacognition, and engagement. Previously a pharmacy student, Thai Duong Pham was recognised as a Monash Dean's Scholar and recipient of a Summer Vacation Research Scholarship. He has contributed through collaborative research, demonstrating a dedication to advancing the fields of pharmacy and education.

Bridging the AI Literacy Gap: Developing and Validating an Assessment of GenAI Competencies for Pharmacy Education

Generative artificial intelligence (GenAI) is increasingly used in pharmacy education. Despite its growing presence, there remains limited understanding of how pharmacy students are engaging with GenAI, alongside a lack of reliable, validated instruments to assess their AI literacy. This study investigates how pharmacy students use GenAI for their learning and validates an instrument developed for AI literacy assessment.
A cross-sectional online survey was administered to undergraduate and graduate pharmacy students at Monash University. The survey collected demographic information, GenAI usage, and responses to a 20-item AI literacy instrument. Analyses employed descriptive and inferential statistics, whilst psychometric properties were examined using classical test theory.

Overall, the study received 673 responses. GenAI was most often used to simplify complex concepts (89%) and summarise texts (85%), and least used for clinical problem-solving (56%) and group tasks (56%). After screening, 592 students were retained for literacy analysis. The mean literacy score was 14.97 (out of 20), with domestic students scoring higher than international students, and native English speakers outperforming non-native speakers (both $p < .001$). Scores also decreased with more frequent GenAI use ($p < .001$). The reliability of the instrument was acceptable ($\alpha = 0.68$), supporting its preliminary use.

GenAI can reduce cognitive burden, improve understanding of complex material, and optimise the learning experience for students with language barriers. However, limitations in technical knowledge and collaborative application, along with the risks of inaccurate content, highlight the need for validated instruments and structured teaching to guide responsible GenAI use in pharmacy education.

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Wen Ao BONG is a PhD candidate at the School of Pharmacy, Monash University Malaysia, specializing in advanced in vitro models for drug testing. His research focuses on developing a colorectal cancer-on-a-chip platform that replicates the human gut and tumor microenvironment to evaluate nanoparticle-based drug delivery systems. By integrating microfluidics, tissue engineering, and cancer biology, his work addresses the limitations of conventional 2D models and the ethical concerns of animal testing, with the goal of enhancing the predictability, efficiency, and ethical standards of early-stage drug development.

Development of Advanced Colorectal Cancer In Vitro Models for Evaluating Nanoparticle-Based Drug Delivery Systems

Colorectal cancer (CRC) is the third most commonly diagnosed cancer worldwide and remains one of the leading causes of cancer-related mortality. Despite advances in surgery, chemotherapy, and targeted therapies, treatment efficacy is still limited by poor specificity, systemic toxicity, and the emergence of drug resistance. Nanoparticle-based drug delivery systems (NDDS) have shown promise in enhancing therapeutic precision; however, their preclinical evaluation continues to rely heavily on animal models, which offer limited predictive power and face growing ethical and regulatory constraints. Recent shifts toward human-relevant, non-animal testing methodologies underscore the need for advanced in vitro platforms that more accurately recapitulate CRC physiology, including the complex tumor microenvironment (TME) and gut epithelial barrier. This study aims to develop a novel in vitro CRC model integrating 3D tumor spheroids, a reconstituted extracellular matrix (ECM), and a functional gut barrier within a microfluidic platform. By simulating critical physiological conditions such as barrier integrity, cellular architecture, and diffusion dynamics, this model seeks to establish a more predictive platform for future NDDS assessment. The successful development of this system is expected to improve the accuracy and translational relevance of preclinical studies, providing an ethical and robust alternative to traditional animal models in CRC research.

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Yuxing (Joyce) Liu is a second-year PhD student at the Centre for Medicine Use and Safety (CMUS). Her research focuses on optimising the safe use of hypnotics in people living with dementia and in residential aged care. She applies a combination of evidence synthesis, real-world data analysis, qualitative research, and preference elicitation to explore both patterns of use and decision-making around hypnotics. Prior to joining CMUS, Joyce worked as a clinical pharmacist and a clinical trial quality specialist in hospital settings.

Prevalence of benzodiazepine, Z-drug, and melatonin use in Australian residential aged care facilities

Objectives: To systematically examine the prevalence of, and factors associated with, benzodiazepine, Z-drug, and melatonin use in Australian residential aged care facilities (RACFs).

Design, setting and participants: MEDLINE, Embase, CINAHL, PsycINFO, Scopus and International Pharmaceutical Abstracts were searched from January 2000 to February 2025 for studies reporting benzodiazepine, Z-drug, and/or melatonin prevalence in Australian RACFs. Overall, regular and pro re nata (PRN) medication use was considered. Screening, data extraction and quality assessment were performed independently by two authors.

Measurements: The primary outcome was overall prevalence (regular and PRN) of benzodiazepines, Z-drugs and/or melatonin. Secondary outcomes included regular prevalence, PRN prevalence and medication class prevalence.

Results: Fifty-two studies (n= 658,585 residents) were included. Overall prevalence of benzodiazepines and/or Z-drugs was 32.5% (95% confidence interval [CI]: 30.4%–34.7%, 30 studies) when assessed over periods from point prevalence to one-year prevalence. Prevalence was highest when assessed using prescribing (35.3%) rather than dispensing (32.0%) or administration (27.7%) data. Findings were similar when limited to studies published in last 10 years (31.0%), studies of ⩾100 residents (32.1%), and when excluding studies conducted in subsets of residents (32.6%). Benzodiazepine prevalence (34.7% [95% CI: 32.5%–36.9%], 24 studies) was higher than Z-drug prevalence (0.4% [95% CI: 0.1%–1.1%], 3 studies). No published studies reported melatonin prevalence, and unpublished regular prevalence ranged 0.9%–8.6% (4 studies).

Conclusions: One in three Australian residents in RACFs use benzodiazepines and/or Z-drugs. Targeted interventions are needed to ensure their use is consistent with evidence-based practice and residents' clinical needs.

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