MONASH University

MONASH
PHARMACY AND
PHARMACEUTICAL
SCIENCES

Alchemy

SPECIAL EDITION

Moulding the pharmacists of the future

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MONASH University

Fast Facts

THOMSON REUTERS HIGHLY CITED RESEARCHERS 2003 – 2013

No.1 worldwide in Pharmacology and Toxicology

QS WORLD UNIVERSITY RANKINGS, PHARMACY AND PHARMACOLOGY

No.1 in Australia and Asia-Pacific 2016
No.4 worldwide 2016
Top 10 worldwide (average 2011 – 2016)

Excellence in Research for Australia 2015

Top rating of 5 in all sectors (well above world standard)

PharmAlliance

with University of North Carolina at Chapel Hill, USA, and University College London, UK

National Alliance for Pharmacy Education

with University of Queensland, University of Sydney, University of South Australia

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Enhanced Doctoral Program in Pharmaceutical Science

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Mind *over* metastasis

Our growing understanding of how stress affects the spread of cancer

One morning early in 2014, while Caroline Le was working in the lab on the fourth floor of building 404 of Monash University's Parkville campus, Cameron Nowell walked in and laid a pig's lymph node on the bench in front of her.

Nowell is a research facilities manager at MIPS. He is the "imaging guy" – the man responsible for all aspects of the microscopy and analysis upon which much of MIPS research rests.

As the two of them examined the lymph node, it began to occur to Le that it might hold the key to a puzzle she had been trying to solve for almost six months.

"Le and Sloan suspected that cancer cells were spreading through the lymphatic system, and that stress was accelerating the rate at which they did so."

At the time, she was working towards her PhD under the supervision of Dr Erica Sloan. In 2010 Dr Sloan had published a seminal paper that established a link between chronic stress and the spread of breast cancer, setting in motion an ever-expanding stream of research that sought not only to understand the relationship between stress and cancer in more depth, but to investigate the potential for new cancer treatments that the relationship suggested.

Dr Le's research focused on the means by which that spread took place. "We expected the cells to spread to the lungs, which they did," said Le. "But stress strongly affected how many cells also appeared in the lymphatic system, which we didn't expect."

The involvement of the lymphatic system shed an interesting light on research that Sloan had previously conducted in collaboration with scientists at Peter MacCallum Cancer Centre, which demonstrated that bigger lymphatic vessels were associated with more rapid and extensive cancer spread. Le and Sloan suspected that cancer cells were spreading through the lymphatic system, and that stress was accelerating the rate at which they did so.

But their hunch was difficult to prove – lymph nodes are tiny and lymph fluid is transparent, making the flow in its natural state effectively invisible to imaging technology. Earlier researchers had added dyes, with mixed success. Le herself had experimented with a variety of different compounds, but none had done what she needed: allowed her to see the lymph flow as it happened.

The pig lymph node that Nowell had brought to the lab had been used for tracking drug delivery. It had been injected with nanospheres – microscopic polystyrene balls that glow. It occurred to Le that this was exactly what she needed to track lymph flow.

By using this technology in mice with cancer, then placing the mice under stressful conditions, she would be able to see whether stress increased lymph flow and whether the activated lymph flow carried greater numbers of cancer cells out of the tumour.

Caroline Le began her academic career investigating not cancer, but Parkinson's disease. She completed a Bachelor of Science at Monash University's Clayton campus, majoring in pharmacology and biotechnology, before coming to Parkville to study towards her honours. It was at Parkville that she first encountered Dr Sloan and her research.

"I've always been interested in research that tries to understand the influence the brain has on conditions that affect the rest of the body," she said. Towards the end of Le's honours year, Sloan approached her about doing a PhD. It was an easy decision.

"I found it fascinating how little work had been done in this area. The connection between stress and disease was proposed almost a century ago by Walter Cannon, the researcher who coined the phrase 'fight or flight'. But it took until around 2005 for his insight to begin to be applied to cancer. There was a study on stress and ovarian cancer released circa 2005, and before this Erica's post-doctoral mentor at UCLA, Steve Cole, did some really interesting work on stress signalling in infection. But Erica really is one of the pioneers in looking at how stress drives cancer spread."

When Le injected nanospheres into the mice in which tumours had been cultivated, it worked. For the first time, researchers were not only able to see evidence that cells were spreading via the lymph glands; they were able to see the spread as it happened.

They watched as high stress levels increased lymphatic flow, making the mouse's lymphatic system a more efficient and networked distributor of cancer cells. In the stressed mice, the lymph network grew bigger, more cancer-carrying lymph flowed, cancer spread happened faster and metastatic tumours grew larger.

Dr Erica Sloan and Dr Caroline Le

On Wednesday, 2 March, Le's paper, *Chronic stress in mice remodels lymph vasculature to promote tumour cell dissemination,* was published in the prestigious journal *Nature Communications.* Media attention was swift and voluminous. In addition to specialist media such as BTW Bioworld, Le and Sloan appeared on news reports for Channel Nine and Channel Ten, and the story was picked up by all the major Australian news publications. Media organisations from as far away as Turkey covered the research.

"I think it resonates with people for a few reasons. Everyone is scared of cancer and most people have been touched by it. It makes intuitive sense – everybody feels like stress is bad for them, even if they don't necessarily know how," Le said. "We've been really careful to emphasise that our research isn't saying that stress causes cancer, but that it promotes its spread."

Like many significant studies, Le's work has raised more questions than it answers. One focus of media attention has been the potential for the development of new cancer therapies, most notably a trial currently being conducted by another of Dr Sloan's collaborators, Dr Jonathan Hiller. In an ongoing clinical study at Peter MacCallum Cancer Centre, Dr Hiller is investigating whether beta-blockers, a class of drugs that have traditionally been used to treat high blood pressure by blocking stress hormones, can slow the spread of breast cancer.

There is cause for optimism about the beta-blocker research. Dr Le's research has shown that beta-blockers can prevent the spread of breast cancer in mice. And in human breast cancer studies, better outcomes have been seen in patients who have breast cancer and have been simultaneously treated for hypertension with beta-blockers.

"There are so many questions to answer from here," said Le. "Can we develop a new generation of beta-blockers that target only the stress receptors found on immune cells and the vasculature? Can the type of anaesthetic used in the surgery to remove the tumour affect patient outcomes? How do beta-blockers work with chemo drugs? When is the best time to treat?"

Moulding *the* pharmacists *of the* future

Designing education for a rapidly changing world

Professor Carl Kirkpatrick *Director, Pharmacy Education*

Every February, dozens of idealistic school leavers step tentatively onto our campus for the first time (if you're reading this, there's an odds-on chance you were once one of them). At that moment, they transform from bright young people distinguished by their passions for science and helping people into something else entirely: pharmacists in training.

The world they enter upon graduation will be markedly different from the one they lived in when their studies commenced; by the time they retire, it will have changed beyond recognition. The way health care is practised in Australia and across the Western world is shifting and developing dramatically.

The question for pharmacy educators is how we best equip our graduates to lead that change and seize the opportunities it will provide.

The answer to that question is complicated because the oncoming wave of change is not monolithic. Instead it is a product of several swells from different directions, all interacting in ways that are difficult to predict.

The first and most obvious of those forces is demographics. The baby boomers – whose existence in many ways drove the creation of the public health systems we now have across the Western world – are retiring.

An ageing population will pose significant challenges for health care. The greater proportion of elderly people will produce resource challenges for our health systems. These patients will have multiple comorbidities associated with ageing, resulting in increased medication use: currently, 43 per cent of people aged 50 years and older use five or more medicines over a 24-hour period; 11 per cent use 10 or more. Recent research from our Centre for Medicine Use and Safety indicates these might be conservative estimates of medication exposure in older people, with poly-pharmacy now the norm rather than the exception.

As a result, the demand for our skills as medicines experts will increase.

The second of these forces is the increasing complexity of medicines, in particular some newer classes such as biologics – complex large molecules that are often produced via recombinant technologies. It has been suggested that biologics now make up around 40 per cent of new medicines coming to market. Biologics increasingly utilise diagnostic tests prior to or after treatment to determine whether the patient might respond, to individualise the dose, or as diagnostic test to evaluate response.

A new realm of personalised medicines approaches will be required, and pharmacists will need to be increasingly active contributors. To do so, we will require ever-increasing levels of scientific knowledge. You can see evidence of this in some of the other articles in this edition, from the pieces on careers in antimicrobial stewardship (page 8) and practice-based PhDs (page 10), to the emergence of advanced practice credentialing (overleaf).

The final force is an evolving understanding of best practice in health care that places a growing emphasis on team-based integrated health care. While this has traditionally been the domain of hospital clinical pharmacy practice, there are now excellent examples extending out of community pharmacies, within GP surgeries via practice pharmacists, and other opportunities outside the bricks and mortar of our current health care.

The growth of integrated primary health care teams will mean that our increased scientific knowledge will need to be equally matched by a growth in soft skills such as teamwork, communication and problem-solving (see, for example, the article on Dr Safeera Hussainy and the faculty's implementation of Objective Structured Clinical Examinations, overleaf).

As a faculty that prides itself on research advancement across pharmaceutical, clinical and practice sciences, and has a deep understanding of the global environment through our strong international relationship, it falls to us to lead the educational change that will ultimately produce this new breed of pharmacist. We are fortunate that we have in the faculty some of the world's most influential researchers (see 'Six of the Best' on page 12). Because they are at the absolute cutting edge of their fields, they are in a unique position to see the ways in which the field will evolve over the next few decades. This level of insight is invaluable in shaping our curriculum.

All of this has resulted in a decision to launch a new course, the BPharm (Hons)/MPharm, which we announced in March this year and will progressively replace our existing course, the BPharm (Hons), from 2017. The enhanced skills and knowledge with which we will be equipping our students can no longer fit inside a bachelor-sized container.

"The way health care is practised in Australia and across the Western world is shifting and developing dramatically."

Continued from previous page

Importantly for the standing of the profession, positioning a master's-level qualification (Level 9 in the Australian Qualifications Framework) as standard signals, both to those in the health professions and to the wider community, that the role of the pharmacist has evolved and will continue to do so.

We have been steadily working towards the new degree for a number of years. Indeed, many of the innovations that will be incorporated in the BPharm(Hons)/MPharm have in fact been developed, refined and implemented as part of our existing degree.

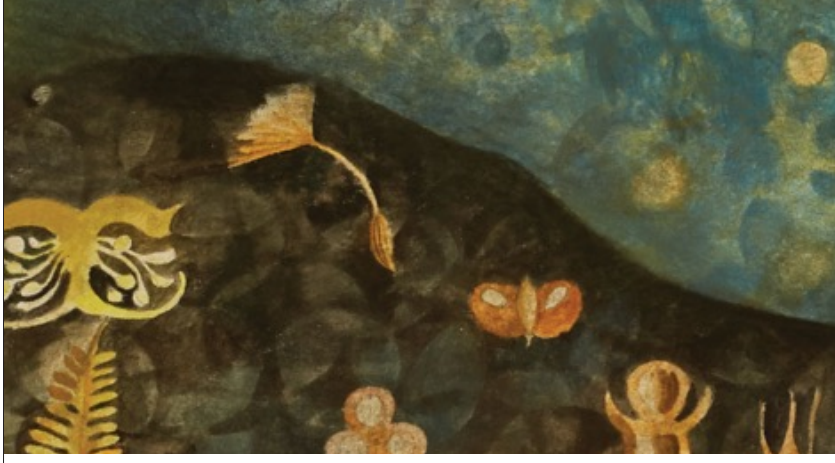
For example, in order to address the emerging need for pharmacists who can work more effectively in teams, the faculty has collaboratively developed and then introduced a range of screening tests that provide feedback to students early in their degree about their professional skills, non-cognitive skills via situational judgement scenarios, and oral and written communication via a Diagnostic English Language Assessment. These screening processes will allow students to identify with a mentor their strengths and weaknesses in these areas, which will feed into a personalised learning plan to guide students in their personal and professional development across the five years of their new degree.

Through all of this, engagement with the wider profession is key. Throughout the development of the new course, we have consulted with a cross-profession group of trusted advisors. Their insights into the competencies that practising pharmacists need now and will need into the future have proven invaluable.

To achieve the desired modified workforce capabilities for the profession, it is essential there be alignment of timeline and expectations with changes in university curricula and graduate training programs. Education that drives change in health care and health outcomes in Australia, and provides the future leaders of the profession, must be informed by partnership and collaboration with all facets of the profession. Furthermore, it must be based upon a deep understanding of the future workforce and health care needs of Australia.

Pharmacists have a clear and increasing role in improving patient health and health outcomes. We are well-suited to providing solutions to the challenge that will define the next few decades. But to do so, we will require enhanced knowledge and skills, and a different philosophy of practice.

I am confident the new integrated degree will play a substantial role in meeting those requirements. But only by drawing upon the strengths in the wider pharmacy community – our alumni, our corporate partners, our practitioners who teach into our programs – will we truly be able to seize the opportunity presented to us.



Pharmacy education *with* initiative

Effective pharmacy education involves much more than clinical knowledge and skills. It should also instil the soft skills and interpersonal capabilities required of a health professional. The faculty has implemented several education initiatives to foster personal growth and professional development.

Dr Safeera Hussainy has extensive experience in educational theory and adult learning principles – developing the educational framework that underpins the education. Safeera lectures in pharmacy practice and is stream leader for the BPharm education team.

Safeera is leading the faculty's implementation of Objective Structured Clinical Examinations (OSCEs). "The OSCE is a performance-based assessment," Safeera explains. "It tests students' soft skills as well as clinical knowledge – the things we look for in a health professional. We'd received feedback from the profession that some students weren't communicating as well as they should. Their clinical knowledge was excellent, but some of their interpersonal skills needed development."

Introduced in 2011, OSCEs have now been implemented throughout the degree. "It's a huge initiative," Safeera says, "and it's delivering results. We're hearing positive feedback from the profession. Graduates have the confidence and ability to effectively interact – all those skills that are valued by patients and other health professionals."

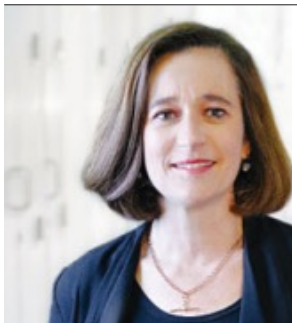
As Safeera explains, these education initiatives are part of the bigger learning and development picture. "These initiatives align with the learning objectives of the course and the Monash graduate attributes."

A Monash graduate herself, Safeera has worked in hospital and community pharmacy. She completed her PhD in palliative care education, and is currently conducting research in women's health. Safeera has recently left us temporarily – on maternity leave.

"It's good research for my women's health project! Everyone's pregnancy is different, but it's giving me valuable insight. No doubt it will give me a wealth of knowledge to share with students in the future. And everything else that comes with it."

The crest *of the* change

Kirstie Galbraith and the new Advanced Pharmacy Practice Framework



In 1617, after many years of lobbying, the Worshipful Society of Apothecaries of London was granted its Royal Charter. The charter definitively separated the apothecaries from the Worshipful Company of Grocers, of which they had until then been a part.

From the vantage point of the early 21st century, knowing how the pharmacy profession has become the custodian of quality use of medicine, the fact that grocers and pharmacists were ever considered parts of the same profession seems bizarre.

Yet it provides a reminder that the structure of the profession is not fixed; that the demands that societies place upon their pharmacists change and the profession evolves accordingly.

In contemporary Australia, with its increasing burden of chronic disease and ever-broadening range of increasingly complex medications, pharmacists are being asked to exhibit more sophisticated skills than ever before. The opportunities for specialisation and advancement are increasing, and the number of pharmacists who have high-level expertise in areas such as research, education or management is growing.

The Australian Pharmacy Council has recently completed a pilot program for credentialing of advanced-practice pharmacists using the Advanced Pharmacy Practice Framework (APPF) developed by the profession.

The Advanced Pharmacy Practice Framework describes 30 advanced competencies across three levels of advancement, and can be used as a tool for evaluating practitioner performance and guiding development.

The 43 pharmacists who took part in the 2015 pilot program demonstrated the impact of their practice via a portfolio of their training, achievements and experience.

Following independent evaluation by a panel of trained credentialing evaluators, candidates were recognised at one of the three levels of advancement. The findings for the pilot program are informing the roll-out of a formal program of advanced-practice recognition for Australia.

Associate Professor Kirstie Galbraith, who is director of the Postgraduate Studies and Professional Development Unit at Monash, is one of 29 pharmacists in Australia and New Zealand who has been independently evaluated by the APC and formally credentialed as an advanced-practice pharmacist.

Associate Professor Galbraith says the pilot program is a strong and much-needed foundation for the future of formal professional development and recognition of Australian pharmacists.

"I expect over time many pharmacists who are performing at a level beyond that of initial registration will seek recognition of their more advanced capabilities via this pathway."

There is an international trend towards a wide range of national initiatives aimed at practitioner advancement. A recent report prepared by the International Pharmaceutical Federation (FIP), which Galbraith co-authored, shows that the use of national frameworks such as the APPF is a key activity for the global development of the pharmacy workforce.

Benefits of developing and recognising advancement in pharmacy practice include enhanced professional development pathways. Credentialing also recognises pharmacists who are able to more effectively manage complexity in many areas of expert practice, including research, education and management.

"I expect over time many pharmacists who are performing at a level beyond that of initial registration will seek recognition of their more advanced capabilities via this pathway."

Keeping *the* powder dry

Careers in antimicrobial stewardship

The dangers of antimicrobial resistance have been recognised since the dawn of the antibiotic age. In 1945, just a few years after penicillin entered broad application, Alexander Fleming used his Nobel Prize lecture to sound a warning about the consequences of irresponsible antibiotic use.

"AMS is a crucial component of health care and is now mandatory in hospitals."

Fast-forward 60 years and resistance is a growing problem. Diseases that were previously thought to have been under control, such as staph, gonorrhoea and tuberculosis, have all developed multi drug-resistant strains. A 2013 report commissioned by the UK government estimates the global death toll resulting from drug-resistant infections at 700,000 a year.

With very limited new antibiotics on the horizon, treatment options for many patients have become increasingly complicated.

Two Monash University Master of Clinical Pharmacy graduates are on the front line of the struggle. Sonia Koning and Kelly Cairns are working as AMS (antimicrobial stewardship) pharmacists, seeking to optimise the antibiotics we use today to improve patient outcomes and prevent further antibiotic resistance.

They are also mentoring current master's students undertaking clinical fellowships in this important area.

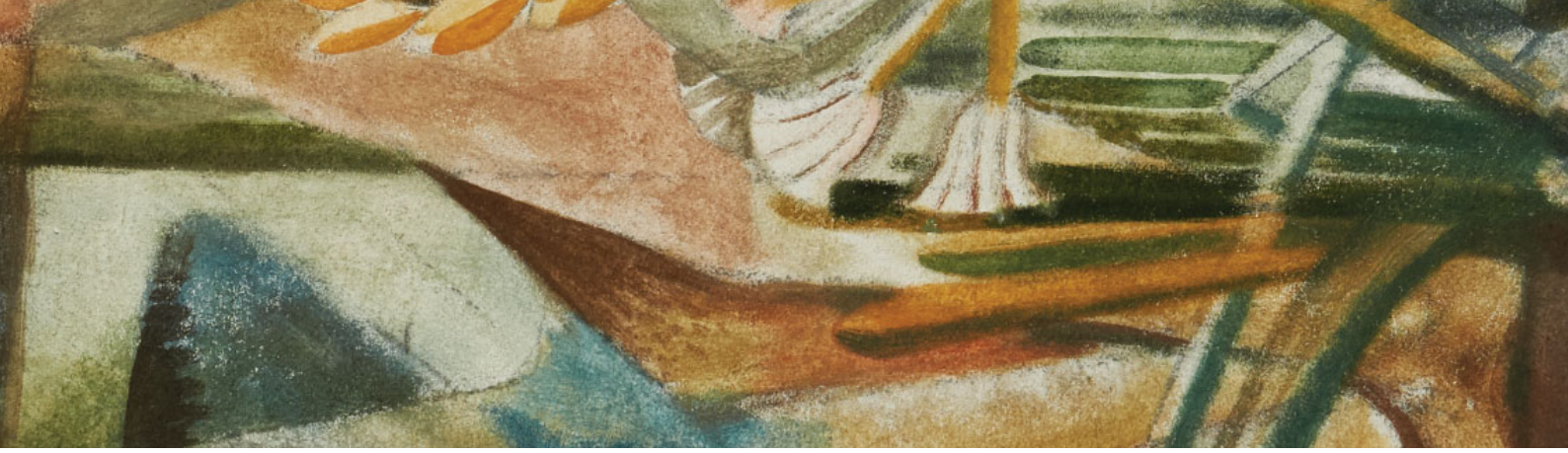
Sonia divides her time between Eastern Health as the senior AMS pharmacist, and Melbourne Health with the National Centre for AMS. She also teaches into a number of the Monash graduate programs. Sonia says she has always had an interest in infectious diseases and in education. Her current roles allow her to do both.

"When I first started at Eastern Health, I was the only AMS pharmacist for the entire network. We've now expanded the AMS program across Eastern Health, to include an AMS fellowship position, which I'm supervising. Mentorship is key to the success of this program."

For Sonia, mentoring is also valuable for reflecting on her own practice. "Guiding others encourages you to keep thinking about your own career. I really enjoy the role and continuing to further my own knowledge and skills. My role with the National Centre has also given me a broader perspective to help advance my practice, and enables me to work with a range of different clinicians."

Kelly Cairns is lead pharmacist for antimicrobial stewardship at the Alfred Hospital. Kelly sees great career potential for pharmacists in AMS. "AMS is a crucial component of health care and is now mandatory in hospitals. As such, many pharmacists around Australia are keen to develop skills in AMS. When I first came to the Alfred, my role was to work as a part of a multidisciplinary team to implement the AMS program, and to optimise antibiotic use. Five years on, it's a well-established service."

A key part of Kelly's role also is sharing her knowledge and experience. "I'm currently supervising one of the Monash clinical fellows completing her Master of Clinical Pharmacy in AMS. The Alfred fellowship is a two-year structured program linking coursework and clinical experience. Fellowships build valuable partnerships between the University and the workplace, and they're invaluable for building knowledge and skills. Teaching is a big part of my role – helping all clinicians improve their antimicrobial knowledge."



Student profile: Rachael Raleigh

Blending work and study

Rachael Raleigh was planning on studying biomedical science while she figured out what she really wanted to do. But her swimming-coach dad convinced her to dive in to pharmacy.

Today, Rachael is senior pharmacist and team leader in cardiothoracic surgery at the Gold Coast University Hospital. She was recently appointed by the Society of Hospital Pharmacists of Australia (SHPA) as a project officer in workforce redesign, an area that is also the focus of the research she is conducting towards her Master of Clinical Pharmacy.

As Rachael explains, the ultimate aim of her workforce project is to increase the scope of pharmacy services across the hospital.

"The SHPA has identified this as a key theme – to develop new models of service provision to address growing patient needs, while working with the resources we have. Effectively utilising the pharmacy technician workforce is essential to optimising clinical pharmacy services, and the scope of practice for pharmacists.

"We know clinical pharmacists improve outcomes for patients, and technicians play an important role in making that happening. Progressing the technician workforce will certainly enhance my clinical role. I look forward to using this work in a clinical context. I really enjoy my job. There are so many opportunities in pharmacy. I've taken them and run with them."

Rachael completed her undergraduate studies at the University of Queensland, then moved to Melbourne for an internship at the Peter MacCallum Cancer Centre, while undertaking the Monash Intern Training Program.

"Peter Mac and Monash are good at building connections," Rachael says. "I went on to a graduate certificate and now my master's with Monash. I've always wanted to do some component of research. I thought the master's was a great way to incorporate research into a postgraduate course and get the support I needed to develop those skills."

Rachael has deftly blended her work, study and research interests.

"I've become more and more involved in workforce redesign over the years. I find it really interesting, so I picked it up with my master's research. There's a lot of crossover in my master's and my current job, which has worked really well. One thing's led to the next."

"There are so many opportunities in pharmacy. I've taken them and run with them."

The many benefits *of* blending practice *and* research

A practice-based PhD not only advances clinical practice and careers, but also promotes the workplace and the profession. Our pharmacy alumni discuss making research of their work, and work of their research.

Erica Tong

Erica Tong
Lead Clinical Pharmacist,
General Medicine, Alfred Health Teaching
Associate, Centre for Medicine Use and Safety

I did my undergraduate degree at Monash, then my master's and now my PhD. I think a lot of people find the thought of a PhD quite daunting, but it hasn't been for me so far. A lot of clinical pharmacists are actually doing practice-based research every day as part of their jobs. I find the PhD is a way of formalising that process. My job already included practice-based research projects, so I thought, "Why not do a PhD part-time?".

I've been at the Alfred for more than 13 years. My PhD is looking at advancing practice roles for pharmacists in general medicine. Specifically, it's focusing on a partnered pharmacist medication charting model. Pharmacists currently don't have prescribing rights in Australia, but we have a model at Alfred Health whereby pharmacists and physicians collaborate to chart patients' medications on admission.

We secured a grant from the Department of Health and Human Services, Victoria, to evaluate our model in 2014. We looked at pharmacists charting medications on admission, as well as completing the medication plan in the medical discharge summaries. We've now been funded to roll our model out to eight health services across Victoria, and we are going to evaluate the model over the next 12 months.

I never really thought I'd be a pharmacist, as both my parents are pharmacists, but I've actually really enjoyed it. It's a flexible career. I currently work and study part-time, as I have an active toddler to look after as well. I'm well-supported by the Alfred, Monash, my supervisors and my family, which makes it all doable. So it's been very enjoyable so far!

Dr Rohan Elliott
Senior Pharmacist,
Aged Care, Austin Health
Clinical Senior Lecturer,
Centre for Medicine Use and Safety

A practice-based PhD is a great way to develop and consolidate your research skills, form collaborations and help to advance pharmacy practice. It provides an opportunity to develop and evaluate new ways of doing things.

I did my undergraduate degree with the Victorian College of Pharmacy, then honours, master's and finally my PhD with Monash. The PhD took about six or seven years on a part-time basis. There were periods of intensity and periods when I was busy with other work. It was a challenging but very rewarding and worthwhile experience.

Part of my hospital pharmacy work was already research-focused. I was doing projects to improve medication management and expand the role of pharmacists in aged care. I was able to leverage that research for my PhD. My thesis was made up of a series of projects. Some of this work has influenced practice and been rolled out in other hospitals. I've developed new collaborations within Austin Health, as well as with other health services.

I'm now supervising other PhD students, which creates opportunities for others in the pharmacy department, and facilitates more research being conducted in the hospital setting. Linking research to practice can be beneficial for your practice, your workplace and the profession. And it's very rewarding.

Dr Greg Weeks
Director of Pharmacy,
Barwon Health

Obviously, when you start your career, you're keen to enhance your clinical skills. I did a Master of Clinical Pharmacy, then moved into management, completing a Master of Health Administration.

More recently, in the latter part of my career, I came to realise how important research is in hospital pharmacy – both in promoting the pharmacy department and in our reputation with medical staff. Barwon Health is now a university teaching hospital with the Deakin Medical School, so there are more academics and a greater focus on research. It's important for the pharmacy department to maintain a similar standing as well.

For some time, I've been interested in advancing pharmacy roles, particularly in pharmacist prescribing. I've always seen these developments in extending practice as very important for the future of pharmacy. There's lots of scope for helping the flow of patients through hospitals. And there are many benefits for pharmacists in extending their scope.

Monash was interested in pharmacist prescribing as well. I did the PhD part-time, building on my practice projects and drawing on those resources. When you're doing practice-based research, you need support mechanisms. It can be challenging at times to maintain the focus and keep up with the level of demand. You certainly need support from your department. The work needs to be well-resourced.

There's great value in that continuum of education and in progressing your career, your practice and your profession through research.

Six *of the* best

The annual Thomson Reuters list of Highly Cited Researchers identifies researchers with the largest number of papers that have achieved 'highly cited' status. Highly cited papers are those in the top 1 per cent most-cited by other researchers around the world.

Six of the faculty's researchers have been named in the 2015 list, making Monash the university with the most highly cited researchers in pharmacology and toxicology research in the world. This means that the papers of these faculty researchers have been identified as being among the most valuable and significant in the field.

Somehow, we managed to gather five of them together one sunny April morning for a photo shoot. *(Professor Bill Charman was unavailable)*.

Continued next page

Pictured, from far left: Professor Arthur Christopoulos, Professor Chris Porter, Professor Jian Li, Professor Colin Pouton, Professor Roger Nation

An understanding of how GPCRs work can lead to enormous advances in the chemical targeting of these proteins and yield improvements to human health in a far more timely and cost-effective manner than is currently available.

Professor Arthur Christopoulos
Drug Discovery Biology

Arthur Christopoulos is an NHMRC Senior Principal Research Fellow and world leader in the study of G protein-coupled receptors (GPCRs – the largest class of drug targets), with particular emphasis on neuropsychiatric disorders. His research focuses on understanding "allosteric" sites on GPCRs – regions distinct from the natural hormone-binding site – and how drugs can be designed to 'bias' signalling to reduce side-effects. Arthur has published more than 240 papers, and received numerous awards, including the Abel Award (US), Rand Medal (Australia) and Gaddum Memorial Award (UK).

A career in pharmaceutical science research provides me with a great opportunity to work at the interface of different but complementary disciplines. In particular, the material and chemical sciences that underpin the design of novel delivery systems, and the molecular and cellular biological sciences that evaluate their utility – it is the best of many worlds.

Professor Chris Porter
Drug Delivery, Disposition and Dynamics

Chris Porter is Professor of Pharmaceutics, Associate Dean (Research) and is a chief investigator in the ARC Centre of Excellence in Convergent Bio-Nano Science and Technology that is headquartered at Monash. His research is focused on the design and development of novel drug delivery technologies, and on understanding the fundamental mechanisms that drive drug delivery to specific target tissues. Chris' published work is supported by grants from the ARC and NHMRC, and long-term collaborations with pharmaceutical and biotechnology industry partners including Starpharma and Capsugel.

For me, fun at work is about studying molecular cell biology with powerful analytical tools – investigating the interface between chemistry and biology. Applying this science to discover new treatments for disease makes our research even more rewarding.

Professor Colin Pouton
Drug Delivery, Disposition and Dynamics

Colin Pouton is Professor of Pharmaceutical Biology and leads Drug Delivery, Disposition and Dynamics. His research focuses on two main areas – the use of cell and molecular biological models in mechanistic investigations of neurological and neurodegenerative diseases, and challenging problems in delivering therapeutic agents. Colin works in both basic and applied sciences, undertaking the serious molecular and cell biology groundwork to solve therapeutic challenges.

Due to the relentless march of multi drug-resistant bacteria, doctors are increasingly being forced to use old antibiotics like the polymyxins, with virtually nothing known about what dose to use. We are providing guidelines to doctors who are otherwise shooting in the dark. It is very rewarding to be working on something that has such potential to benefit people. Real-world impact is very important.

Professor Roger Nation
Group Coordinator – Biopharmaceutics and Pharmacokinetics/Pharmacodynamics Drug Delivery, Disposition and Dynamics

Antibiotic resistance, compounded by the lack of new antibiotics, poses a significant global medical challenge. Without new antibiotics, clinicians have no effective remedy for the growing threat of drug-resistant superbugs. Most of the modern pharmacological data on polymyxins available today were obtained by our group. Our extensive research makes this drug discovery program unique.

Professor Jian Li
NHMRC Senior Research Fellow
Drug Delivery, Disposition & Dynamics

Roger Nation and Jian Li are among the world's foremost experts on polymyxin antibiotics. These are 'old' and hitherto poorly understood antibiotics that are active against important bacterial 'superbugs', but they can also cause kidney damage. Their work has led to the publication of the first scientifically-based dosage regimens for the polymyxins, to allow doctors to use them safely and effectively. They also seek to create novel polymyxins with greater antibacterial activity and lower toxicity. Their work to optimise the clinical use of the current polymyxins and develop a new generation of polymyxins to combat antibiotic resistance has attracted numerous research grants from the NHMRC and the US National Institutes of Health (NIH). President Barack Obama highlighted the NIH-supported research as a prime example of successful innovation and science cooperation between the US and Australia. Their work has also been recognised in the NHMRC's annual Ten of the Best Research Projects. Roger has published more than 300 papers and was chair of the 1st International Conference on Polymyxins held in Italy in 2013. Jian has published 186 papers and is currently leading four large five-year NIH projects on polymyxins.

Our ambitious vision and commitment to innovation in research and education continue to drive all that the faculty does.

Professor Bill Charman
Dean, Faculty of Pharmacy and Pharmaceutical Sciences
Director, Monash Institute of Pharmaceutical Sciences

Bill Charman's research has been characterised by a multidisciplinary and collaborative approach to address major issues in drug discovery, drug delivery and the pharmaceutical sciences. Bill has published more than 350 papers and contributions, and received numerous international awards. Bill is a Sir John Monash Distinguished Professor.

Q&A *with* Traci Lourey

Traci Lourey is the faculty's manager of professional experience and industry placements, and department administrator for the Centre of Medicine Use and Safety (CMUS). It's a diverse and dynamic role. And Traci is perfectly cut out for the job. We ran to catch up with her…

Tell us about your work with the faculty.

I look after the students on placements in third and fourth year. I'm also involved with summer school. And I provide some admin assistance for Carl Kirkpatrick and CMUS.

I originally came to fill a temporary role for a few weeks. That was six years and six roles ago. I started off in research and filled two roles there. Then I filled an acting role as postgraduate coursework manager. Then HR, followed by some course structure and planning work. I've been in my current role for a couple of years.

I've been in so many different departments, my colleagues joke, "Why use ask.monash when you can just ask Traci?!"

You grew up on a farm?

Yes, a dairy and beef farm on King Island. It's a funny place to be brought up. No exposure to a lot of things. We survived on a generator and ABC TV. I didn't even know what *Gilligan's Island* or Maxwell Smart were.

We still have the farm. It's great for the kids to have that experience. We have three kids – 19, 16 and 8. The oldest one's at uni.

What else have you done?

I did a Bachelor of Education, then a postgrad degree in business (sports management). I worked with Monash Sport for about eight years on and off as a fitness coordinator. I worked for the Melbourne Cricket Club in marketing. My husband and I lived and worked in Saudi Arabia for a couple of years with our children.

When we came back, we bought a gastropub – the Homestead in Fitzroy North – which I ran for three years. It was a challenging but exciting journey. Within 12 months, we were listed among the top five gastropubs in Australia. But when I became pregnant with our third child, we decided to move on.

You've done so much, you're perfectly qualified for professional experience and industry placements!

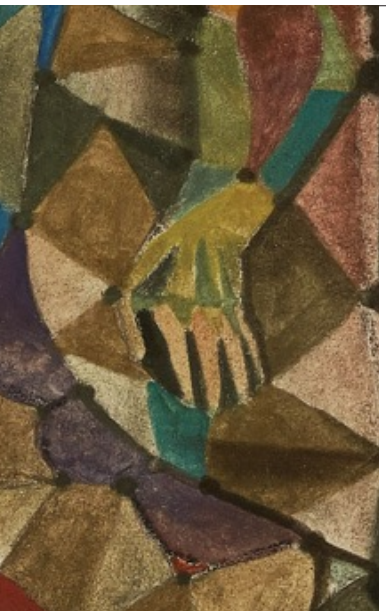
Yes, it really suits me. Being a mother and trying to find that whole work-life balance thing can be tricky.

I fell and worked my way into this role. It's dynamic and busy. Working with students and stakeholders in an industry that's constantly changing is challenging but rewarding. Being brought up on a farm, running my own business and working in so many different areas have definitely given me the skillset for such a diverse role today. I'm not one to sit still!

Too much *of a* good thing?

Investigating multiple medicine use in aged care.

More than half of older Australians suffer from multiple chronic medical conditions, often resulting in complex medicine regimens and the use of multiple medicines. Although sometimes unavoidable, this 'polypharmacy' has been implicated in adverse drug events, drug interactions, cognitive and functional decline, and frailty.



In the community setting, polypharmacy is often classified as five or more medicines. In residential aged care facilities however, it's often nine or more. And its prevalence is increasing. This presents challenges for providers and residents alike, and growing demand for skilled medicine administration.

The Centre for Medicine Use and Safety is investigating polypharmacy in residential aged care facilities, and exploring ways to better manage multiple medicine use. Associate Professor Simon Bell says the work aims to assess the risk-to-benefit ratio of taking multiple medicines.

"The risk-to-benefit ratio of taking a medicine is not static over a person's lifetime," Simon explains.

"Medicines that were once prescribed appropriately in the community setting may no longer represent a favourable ratio in the residential aged care setting. Our work aims to quantify the adverse effects of polypharmacy and provide better evidence on which clinicians can base their prescribing decisions."

Simon and his team recently conducted audits of medicine use in 27 residential aged care facilities throughout rural and regional Victoria. This is one of two current projects the team is conducting with grant funding from the Victorian government's Department of Health and Human Services.

In another project, supported by the Alzheimer's Australia Dementia Research Foundation and Resthaven Inc., Simon and his team are investigating medication-related factors associated with quality of life, falls and hospitalisations. The project, which works with aged care facilities in South Australia, is managed by Monash-trained Austin Health pharmacist Samanta Lalic, who recently commenced her PhD.

There is little existing research in this area.

"Our clinical practice guidelines and the clinical trials on which these guidelines are based usually aren't specific to aged care facilities. Residents are often older, frailer and more susceptible to adverse events, such as falls, than clinical trial participants. We're working to develop an evidence base for these residents. We want to understand whether a particular combination of medicines is consistent with a resident's goal of care," says Simon.

And a resident's goal of care, Simon points out, also changes over time.

"In the final years of life, the focus may not necessarily be on long-term prevention, but instead optimising quality of life."

The need to provide adequate analgesia, but avoid unwanted side effects, led Simon and his team to research the association between opioid analgesic use and daytime sleepiness.

This project was managed by Monash pharmacy graduate Dr Edwin Tan, who recently received a prestigious National Health and Medical Research Council – Australian Research Council (NHMRC-ARC) Dementia Research Fellowship to undertake collaborative new research with the Ageing Research Center at the Karolinska Institutet in Sweden.

One of the topics Simon and his team are particularly interested in is deprescribing – the reduction of potentially inappropriate or unnecessary medicines. Recent survey results, published by fourth-year pharmacy student and winter research scholarship recipient Mona Kalogianis, suggest nearly 80 per cent of residents would be willing to stop one or more of their regular medicines if their doctor says it's possible.

Another member of the centre's research team is PhD candidate Natali Jokanovic, who works as a pharmacist in geriatrics at the Alfred Hospital. Natali completed her BPharm at Parkville and her internship at the Alfred. Shortly after, she returned to launch into her PhD.

L-R: Assoc Prof Simon Bell, Esa Chen, Dr Julia Gilmartin, Dr Natasa Gisev, Mieke Hutchinson-Kern, Kate Wang, Natali Jokanovic, Samanta Lalic, Dr Jenni Ilomaki, Tali Ryan-Atwood, Laura Fanning.

"As a hospital pharmacist working in aged care and rehabilitation, I see many patients who take quite a lot of medications," Natali says. "They're very complex and have a lot of comorbidities. So researching polypharmacy in residential aged care facilities links well with my practice."

Natali believes pharmacists can make a great impact working in aged care, especially in terms of polypharmacy. "Older people who take multiple medicines are common patients of community and hospital pharmacies. Pharmacists have expertise and knowledge in drug interactions and adverse events. I see a lot of patients entering aged care facilities for the first time, where they'll typically have a different GP. The possibility of having a pharmacist involved in that transition would make a big impact."

Natali is about to embark on a research visit to Finland. "I'll be working with a geriatrician at the Helsinki University Central Hospital. They're investigating very similar issues in their aged care facilities. It's an exciting opportunity – to travel and work with different researchers and discuss similar issues from different perspectives. That's one of the great benefits of doing a PhD."

Simon agrees aged care is an increasingly important area for pharmacy. "Most aged care facilities don't yet employ pharmacists as salaried members of staff. There's a great opportunity for pharmacists to be involved in simplifying medication regimens, ensuring medicines are administered appropriately, and monitoring for adverse events. There's the opportunity to have much greater involvement in residential and community-based aged care programs."

Simon's research is also supported by the NHMRC Cognitive Decline Partnership Centre and NHMRC Frailty CRE, a new collaboration between national and international partners, including institutions based in the US, Canada and France.

Pharmabridge *helps* Filipino pharmacy flourish

In November 2015, Philippines academic pharmacists Ferlien Baula and Cherrie Muana were hosted by the faculty as part of Pharmabridge, a voluntary initiative aimed at strengthening pharmacy services in low-income and emerging countries.

"Our aim is also to apply our observations in clinical and community pharmacy settings to improve pharmacy practice in the Philippines."

Supported by the International Pharmaceutical Federation (FIP), Pharmabridge was founded in 1999 with the aim of strengthening pharmaceutical services and pharmacy education in developing and transitional countries. It links schools of pharmacy, pharmacist associations, drug information centres, hospital pharmacies and individual pharmacists from developing nations with pharmacy establishments in developed and more advanced developing countries.

Assistant Professor Buala and Dr Muana, who are from the University of Immaculate Conception in Davao City, undertook a four-week placement that saw them spend time at the faculty, major Melbourne and rural hospitals, community pharmacies and professional pharmacy associations. This is the first time either the University of Immaculate Conception or Monash University have been engaged with Pharmabridge, enabling Assistant Professor Baula and Dr Muana to study Monash's approach to clinical teaching, Objective Structured Clinical Examinations (OSCEs) and the role of pharmacists in antimicrobial stewardship.

"The information gathered throughout our visit will play a key role in enabling us to continuously develop our university's pharmacy curriculum in the context of best practice in pharmacy education. Our aim is also to apply our observations in clinical and community pharmacy settings to improve pharmacy practice in the Philippines," said Assistant Professor Baula.

Monash's director of Project Pharmacist, John Jackson, who facilitated the visit, spoke about the value of the program in enabling pharmacists from developing countries to experience advanced teaching and practice. "Monash has a long history of collaboration and sharing information and resources for the improvement of pharmacy practice and education worldwide. I am delighted that we were able to provide this program for our colleagues from the Philippines, and thank the many faculty staff and the staff of the hospitals and community pharmacies who contributed to the program."

Monash will also adapt and share academic materials and innovative teaching tools MyDispense and Pharmatopia with the University of Immaculate Conception. Developed by the faculty, MyDispense and Pharmatopia are programs that enable students to practise their dispensing and tablet formulation skills in a virtual environment.

In the report prepared by Assistant Professor Baula and Dr Muana about their experience of the Pharmabridge program, they described it as an "upbeat and life-changing experience down under". They are grateful for the opportunities and training that were given, and it made them realise that their country needs champions who would lead the advancement of pharmacy practice, and that it would best start from educating the next generation of pharmacists.

Landmark study demonstrates *importance of* medication reviews

A landmark study by the Centre for Medicine Use and Safety has demonstrated the importance of clinical medication reviews (CMRs) in improving the quality use of medicines. Published in *Research in Social and Administrative Pharmacy*, this is the first systematic review of CMR research undertaken in Australia.

The study demonstrates the value of medication review models that incorporate interprofessional collaboration. Structured and collaborative medication reviews performed by pharmacists and general practitioners identify potential problems, improve adherence and reduce hospitalisations.

Associate Professor Simon Bell says this is an important finding. "Up to 30 per cent of unplanned hospital admissions among people aged 75 years and older are medicines-related," says Associate Professor Bell. "The research shows that clinical medication reviews improve the quality use of medicines in older Australians."

The review identified a lack of access and awareness among certain groups, including people from Indigenous and linguistically diverse communities, recipients of palliative care, people with poor medication adherence, and those in rural and remote areas. Addressing these "access gaps" represents an opportunity to further improve the current model for CMRs in Australia.

National president of the Pharmaceutical Society of Australia, Joe Demarte, emphasises the significance of the research. "This review is a landmark study in that it provides an overview of the research to date and describes the clinical, humanistic, economic and qualitative benefits of medication reviews," Mr Demarte says.

"This review is landmark in that it provides an overview of the research to date and describes the clinical, humanistic, economic and qualitative benefits of medication reviews."

Teacher practitioners: dispensing *better* learning

Our graduate pharmacy education is enhanced by highly experienced practising pharmacists sharing their knowledge and skills. Teacher practitioners such as Sharmila Khumra, Amy McRae and John Coutsouvelis bring specialised expertise to the University, and build valuable connections with the workplace. And they're enhancing their own clinical practice in the process.

Sharmila Khumra
Senior Pharmacist, Infectious Diseases (ID), Austin Health

I did my internship in a hospital setting and I continue to work at Austin Health today as a senior ID/antimicrobial stewardship pharmacist.

After initially working as a ward pharmacist, I pursued a role in drug use and evaluation. This sparked my interest in quality use of antimicrobials and gave me the opportunity to work closely with the ID unit and enhance my knowledge and skills in antimicrobials and infection management.

When Monash approached me to consider teaching, there was a growing awareness of antimicrobial stewardship and the need to upskill pharmacists in the area of ID pharmacotherapy. There was no formal education for pharmacists in this area. I thought this was a great opportunity to share my knowledge and experience.

I work two days a week at Monash and two at Austin Health. What I learn in one workplace can be applied to the other. There's a lot of practical experience we can share – students appreciate learning from real-life cases from the workplace. It's bridging theory and practice.

It's valuable for me to keep my finger on the pulse when working at Austin Health so that I can create current and relevant teaching materials in my Monash role. On the other hand, I can transfer my teaching skills to my practice, which has allowed me to become a better clinical educator.

Amy McRae
Senior Pharmacist, Quality Use of Medicines, Western Health

I did my internship at the Alfred and worked there for a number of years before doing the Master of Clinical Pharmacy. Through my master's I was rotated into medication safety. My research project focused on quality use of medicines.

As part of my master's, I went to England for my clinical placement, investigating medication safety strategies over there. It was a great experience. Then I secured a senior role at Western Health in quality use of medicines, and I've been there since. Medicine safety has become my passion.

I really enjoy teaching and working with pharmacy students. It's become one of the highlights of my career. I'm currently involved in the clinical research component of the Master of Clinical Pharmacy, guiding and providing support to the students.

We bring skills from practice to the University, to build a better learning experience. My experience in research and project work assists the students with their clinical research projects.

I also oversee students in my work at Western Health. It's rewarding to combine education, research and clinical practice – for all involved. They complement each other. Ultimately, the aim of all our work is to benefit the patients.

John Coutsouvelis
Senior Clinical Pharmacist, Cancer Services, Alfred Health

I've worked in cancer services since early in my career. I practised for 10 years at Box Hill Hospital before undertaking my Master of Clinical Pharmacy. After that, I moved to the Alfred, where I've been the senior clinical pharmacist for cancer services ever since.

Around that time, Monash asked me to join the team delivering the master's program. They wanted more advanced practitioners teaching across the board. There's a lot of teaching involved, along with coordination of other specialist practitioners.

It's putting a very practical spin on teaching – learning not just the science, but how that applies to patients. You always have to bring it back to the patient, and that's what practitioners do. We've been at the bedside, so we know how to bring theory into practice.

I enjoy the patient-focused aspects of my clinical work, and I enjoy the teaching and research components of my education work. Melding those together is very rewarding. It brings relevance to the teaching. I started my PhD in recent years as well.

As pharmacists, we're expected to teach students and supervise interns, but not so formally. Working in the university gives you the skills to be a better mentor. It also helps to make what we teach and what we practise a lot more relevant – across all facets of pharmacy.

Pictured right: Amy McRae and John Coutsouvelis

Broadening *the* mind, *expanding the* waistband

Nick Sourlos has been craving roti canai every day since returning from his semester in Malaysia.

"In my dorm there were eight guys from Germany, South Africa, China and England. I didn't expect to become such good friends with them. Living with students from all over the world makes you more open-minded. You learn customs and slang you'll never pick up in a lecture hall."

The fourth-year pharmacy student spent six months on an inter-campus exchange at Monash's Sunway campus in Malaysia. In leaving his parents' home in Melbourne, he didn't just fly the nest; he embraced another country, its customs and its traditions.

"Exchange was a chance to be really independent. Having to make some quick decisions without help from friends and family will test you, and in the process you'll get to know yourself a lot better.

"I got to meet so many great people and had plenty of time for travel – but Malaysian food was the true adventure.

"Combining Indian, Chinese and Malay cuisine, you'll find nothing else like it. I loved the experience of eating satay from a hawker. You pay next to nothing and it tastes incredible – and that rarely happens in life," says Nick.

Nick spent the six months living in shared student accommodation.

"Other than the food, I miss my mates," he says.

"In my dorm there were eight guys from Germany, South Africa, China and England. I didn't expect to become such good friends with them. Living with students from all over the world makes you more open-minded. You learn customs and slang you'll never pick up in a lecture hall."

Nick travelled around Malaysia – snorkelling in the Perhentian Islands, exploring Malacca, seeing wild fireflies and orangutans in Borneo, and sipping tea in the Cameron Highlands. He also visited Japan, Singapore, Hong Kong, Indonesia and Thailand.

Professor Bill Charman, Dean of the Faculty of Pharmacy and Pharmaceutical Sciences, said the world is becoming a smaller place, and opportunities for travel and collaboration across borders continue to grow.

"We work very closely with our colleagues in Malaysia, so no matter where the classroom is, students will get quality education. The program works both ways. We encourage Malaysian students to come and experience a semester in Australia, too," he says.

As far as Nick's concerned, going on exchange is a no brainer. "Approach it with an open mind. If you're willing, you'll meet so many great people and see so many incredible places that are so different from your experience at home.

"Moving to a foreign country can be nerve-wracking. But when you return home you'll feel as if you've conquered the world."

Pictured left: Nick Sourlos

New media studio

The faculty has recently opened an in-house digital media production facility.

Open to all staff, the Parkville Media Studio has been developed to support active learning techniques (championed within the faculty by the Director of Learning and Teaching, Dr Ian Larsen, and the Associate Dean (Education), Dr Paul White, as detailed in *Alchemy* issue 27).

The new facility is designed to be versatile and easy to use, enabling staff to produce innovative and engaging materials to support their teaching.

Simple touchscreen controls automatically set the scene, enabling users to concentrate on the presentation and not worry about the technical side.

Video is optimised for use online, so it can be easily added to a unit in Moodle. The facility also functions as a photographic studio.

International alliance *makes* strides

PharmAlliance, the faculty's partnership with University College London and the University of North Carolina at Chapel Hill, has begun its work tackling some of the grand health care challenges of our time, with its first round of grant funding announced in February.

Established in March 2015, the alliance enables the partners to pursue new research, education and practice collaborations to address major international issues in the fields of drug discovery and development, nanomedicine and nanotechnology development, and clinical pharmacology.

"Many of the problems we're facing are too big for one institution on its own to solve. We strongly believe that combining our intellectual resources is the best way to tackle them," said Professor Bill Charman, Dean at Monash.

The first round includes funding for two projects aimed at further improving the quality of pharmacy education.

One of these will develop an education module to prepare pharmacy students to provide better health care to adolescents, an area that has been highlighted by the World Health Organisation as in need of improvement.

Of the four research collaborations funded, two are led by Monash staff.

Research led by Joe Nicolazzo aims to fill a knowledge gap and generate basic information regarding drug disposition in Alzheimer's disease.

And a team led by Sue Charman will conduct in vitro and in vivo evaluation of leads in support of the development of a treatment for portal hypertension.

MIPS research *crucial to* record-breaking licensing deal

In what is believed to be one of the largest preclinical licensing deals involving an Australian discovery, a suite of drugs developed by the Cancer Therapeutics Cooperative Research Centre (CTx) from Monash early research has been licensed to global healthcare leader MSD.

The drugs – which are inhibitors of protein arginine methyltransferase 5 (PRMT5) – have potential clinical applications in both cancer and non-cancer blood disorders.

The importance of PRMT5 was first discovered by Professor Stephen Jane, head of the Monash Central Clinical School, who initiated the search for inhibitory drugs. These drugs were further developed by CTx, a Melbourne-based Cooperative Research Centre (CRC) focused on the discovery and development of novel therapies for cancer, in collaboration with Professor Susan Charman, director of the Centre for Drug Candidate Optimisation within the Monash Institute of Pharmaceutical Sciences, with support from the Wellcome Trust. Cancer Research Technology (CRT), the development and commercialisation arm of Cancer Research UK, has licensed rights to MSD on behalf of CTx in a package worth up to A$730 million.

The PRMT5 protein is involved in many cellular processes, including the epigenetic control of genes such as p53 – a gene that protects the cell against cancer-causing mutations and is faulty in nine out of 10 cancers. High levels of PRMT5 protein are found in mantle cell lymphoma (MCL), chronic lymphocytic leukaemia (CLL), melanoma, lung and breast cancers, and are linked to poor survival.

In addition to applications for cancer, PRMT5 inhibitors switch on important genes in the development of blood, which could provide disease-modifying treatment options for patients with blood disorders such as sickle cell disease and beta thalassemia.

MyDispense *goes* multilingual

MyDispense, the online pharmacy simulation developed at Monash and used in pharmacy schools and universities across the world, is branching beyond the Anglosphere.

The development of French, Spanish and Portuguese language versions of the software was recently discussed at a conference at Monash's Prato campus in Tuscany in July. The conference brought together pharmacy educators from around the world.

MyDispense allows students to develop their dispensing skills in a safe environment where they can make mistakes without suffering the serious consequences they would face in the real world.

Since developing the technology in 2011, Monash has licensed it free of charge to 26 other pharmacy courses in countries including the US and the UK, with a view to improving standards of pharmaceutical education and patient outcomes around the world.

"So far MyDispense has largely been used in wealthier countries. With the extension of the platform to new languages, we hope that students and communities in the developing world will increasingly be able to enjoy its benefits, too," said Learning Technologies Project Manager Keith Sewell, who has led development of MyDispense.

MIPS *research draws* significant ARC funding

In the latest round of competitive research funding announced by the Australian Research Council (ARC), the Monash Institute of Pharmaceutical Sciences has received the largest Discovery Projects grant awarded to a Monash researcher.

The $667,850 grant will facilitate a more detailed understanding of G protein-coupled receptors, the largest group of cell surface signalling proteins, using novel chemical tools.

Head of Medicinal Chemistry Professor Peter Scammells will lead the research.

Where *are they* now?

Christine Wun '14

After graduation, Christine Wun (BPharm Sci (Hons) (Form Sci) 2014) jumped at the opportunity to work for Vaxxas, a Brisbane-based company that is changing the face of vaccine delivery technology. Moving away from Melbourne was a big step, but the company's reputation and its revolutionary work in vaccine delivery technology were real drawcards for Christine. She joined a team of scientists working on the company's proprietary Nanopatch, a needle-free vaccine-delivery platform that aims to eliminate the need for cold-chain transport of vaccines. Her job includes optimising different vaccine formulations to be coated onto the Nanopatch, and performing assays to ensure the products meet quality control requirements. She is also involved in the small-scale manufacturing of the product. Christine hopes that her interest in nano-scaled materials and their application in different fields will open up many more career opportunities down the track, from pharmaceuticals to food products and cosmetics.

Outside of work, Christine enjoys travelling and seeking out new experiences – in an ideal world she would like to be able to travel to a new destination every year. She has also taken up kayaking and finds it a good way to relax out on the water, be it the river or out at sea – especially with the scenic spots the sunshine state has to offer.

Jennifer La '08

Jennifer La (BMedChem (Hons) 2008) took her interest in chemistry and biology to a new level when she enrolled in Medicinal Chemistry at Monash. Her PhD, which she completed in 2013, focused on the discovery of novel HIV reverse transcriptase inhibitors for the prevention and treatment of HIV.

In 2014, she joined the bio process development team at CSL Limited in Parkville as a GMP quality scientist. In this role, she provided experimental support for the manufacturing, quality and regulatory departments within CSL, working on a variety of recombinant protein therapeutic products.

Staying on with CSL, Jennifer transitioned into a new position in 2015 in the assay development group. In her current role, she collaborates with scientists at BIO21 in Parkville and CSL in Marburg, Germany, to characterise and profile clinical candidates by developing a diverse range of analytical assays to study their post-translational modifications, protein activity and protein structure.

In her spare time, Jennifer loves travelling, skiing and volunteering at her local soup van organisation.

Amir Hanna-Elias '02

A career in the pharmaceutical industry was always on the radar for Amir Hanna-Elias (BPharm Sci (Hons) 2002) (PhD Medicinal Chemistry 2008). After completing his undergraduate degree, he joined a start-up complementary medicines company as a development chemist, where he led product development projects from concept to commercialisation.

Returning to Parkville and completing his PhD in Medicinal Chemistry a few years later, he then worked for Novartis' consumer health care department as a medical affairs associate. The move enabled him to work on more technically challenging products and gain experience in a range of consumer health areas such as disseminating medical information, pharmacovigilance, sales force training and therapy area expertise.

With his interest and experience in technical roles and products that influence patient outcomes, Amir made the move to the GSK pharmaceuticals business working in the rate diseases portfolio of pulmonary arterial hypertension, firstly as a scientific advisor and now as a medical science liaison.

Amir's passion for science is matched by his passion for health, fitness and football. An avid supporter of Melbourne Victory, Amir loves spending time with wife Georgia, daughter Lily and little football player son Alexander, who is already following in dad's footsteps as a Melbourne Victory fan.

Henry Grossbard '58

For Heinz (Henry) Grossbard (PhC1958), community pharmacy and helping people has been a lifelong passion that continues today.

Graduating from the Victorian College of Pharmacy on Swanston Street, he worked as a locum before purchasing his first pharmacy in St Kilda, and then the landmark pharmacy of D.C.Tait in Swanston Street. He also worked in various Melbourne hospitals, but the attraction of community pharmacy was too strong and he subsequently opened two new pharmacies in Doncaster and Boronia. Henry also developed a very strong interest in complementary medicine, which led him to qualify as a naturopath, study acupuncture and run a naturopathic clinic along with his busy pharmacies.

Henry had a very early realisation on the importance of pharmacies offering "front-of-shop" professional services, and proved this when he bought a struggling pharmacy in a suburban shopping centre. Assisted by his pharmacy technician wife and hiring a full-time pharmacist, he turned the business around, increasing prescription volume from 60-70 prescriptions daily to 300-400 daily. He credits this to the face-to-face service he was able to provide to his clients.

A firm believer in the wider role of community pharmacy in providing health care, he completed a postgraduate qualification as a diabetes educator at Deakin University. Today, Henry is still a registered pharmacist working as a diabetes educator at various medical clinics, and conducts medication reviews for his clients both at home and at the clinics.

Remembering Brian Cossar

On 9 December 2015, the faculty mourned the passing of Brian Cossar, an exemplary alumnus, pharmacist and lifelong supporter of the faculty.

Few names have been as synonymous with the pharmacy profession and the faculty as the Cossar name. The family is known for its generous philanthropic support in the relocation of the Victorian College of Pharmacy to Parkville, and Brian maintained a close association with the faculty throughout his life. He was a proud and active member of the Cossar Club, set up to acknowledge those who supported the faculty with a bequest, and welcomed new members with pride. In 2013, Brian featured in the short film *Years of Determination*, detailing the faculty's rich history and his family's involvement.

The dean of the faculty, Professor Bill Charman, paid tribute to Brian's generosity of spirit and lifelong involvement with the pharmacy profession and the faculty. "Brian Cossar was a quiet achiever of the profession, an exemplary pharmacist and alumnus. He took great pride in his family's connection to the faculty and always spoke fondly of his time at 'the college'. He gave his time generously to mentor our students and was highly respected by generations of pharmacists who worked and learnt from him over the course of a long and distinguished pharmacy career."

Brian graduated in 1960, the last of the group of students to go through the apprenticeship model. Following graduation he spent some time in the UK before returning to Australia in 1962 to join his father Norman in running the family's numerous pharmacies under the banner of Henry Francis & Co. The Cossar family was the principal owner of Henry Francis and Co for more than 80 years, with Brian continuing the family tradition until his retirement in 2001.

Throughout his career, Brian took an active interest in the future of the profession and was elected to the Pharmacy Guild Victorian branch committee in 1990, representing pharmacists in the central business district and inner suburbs of Melbourne until 1996. He was also treasurer of Community and Pharmacy Support (CAPS) in Victoria, a national pharmacy group formed in 1989 to fight federal government changes to the National Health Scheme. Brian was a life member of the Pharmaceutical Society of Australia and in 2010 received a certificate of appreciation from the Pharmaceutical Society (Victorian branch) in recognition of his ongoing and personal support to Victorian pharmacists.

A celebration of Brian Cossar's life was held in Melbourne on 10 December 2015. He is survived by his loving wife, Julie.

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