Research at the Faculty of Health Sciences

Discovering new ways to improve health and wellbeing for all







Research at the Faculty of Health Sciences

2019 edition

Foreword

Staff and students in the Faculty of Health Sciences at the University of Sydney lead research into health and wellbeing. We are committed to solving critical health problems by discovering new ways of tackling society's biggest challenges, influencing health policy by transformative thinking, and identifying new models of healthcare delivery.

We do this through multidisciplinary and collaborative research, partnering with local and global organisations, and working closely with people and communities to identify solutions that directly translate to health benefits.

As part of our research strategy, the Faculty of Health Sciences attracts high quality research students, at both the master's and PhD level. We are committed to providing our students with a positive and comprehensive experience in a supportive, engaged and high quality research environment.

Areas of research strength

The Faculty of Health Sciences has prioritised a number of cross-cutting research themes that reflect the strength, diversity and depth of our research. This structure enables us to be responsive to changes in the health and medical research landscape, and rapidly address societal, industry, government and global priorities.

Research themes

- Physical activity, lifestyle, ageing and wellbeing
- Musculoskeletal health
- Communication sciences and disorders
- Cancer diagnosis and rehabilitation
- Disability and mental health
- Medical imaging
- Aboriginal and Torres Strait Islander health
- eHealth and healthcare delivery

Our Research Theme Leaders engage with key stakeholders across the University, nationally and internationally to ensure our research discoveries have the greatest impact to benefit society.

- sydney.edu.au/health-sciences/research

We acknowledge the tradition of custodianship and law of the Country on which the University of Sydney campuses stand. We pay our respects to those who have cared and continue to care for Country.

Message from the Dean	3
Physical activity, lifestyle, ageing and wellbeing	4
Professor Lindy Clemson	5
Professor Maria Fiatarone Singh	6
Associate Professor Lee-Fav Low	7
Meredith Gresham	7
Associate Professor Ollie Jav	8
Mohammad Fauzan Bin Maideen	0
	7
Musculoskeletal health	10
Professor lim Elliott	11
Aimie Peek	
Dr Trudy Robbook	12
	10
Communication sciences and disorders	14
Professor Leanne Togher	15
Marvane Gomez	10
Mai yane Gomez	10
Professor fricia McCabe	1/
Cancer diagnosis and rehabilitation	18
Professor Patrick Brennan	10
Pobyn Siorla	
Robyil Siella	
Professor Sharon Kildreath	ZI
Disability and mental health	22
Associate Professor Jennifer Smith-Merry	23
Professor Gwynnyth I lewellyn	24
Sai Soe	24 25
	20
Medical imaging	26
Professor Steven Meikle	27
Mo'avvad Suleiman	28
Associate Professor Mark McEntee	29
Aboriginal and Torres Strait Islander health	30
Dr John Gilroy	
Professor Jennifer Alison	32
Dr Vanessa Lee	33
	00
eHealth and health care delivery	34
Professor Tim Shaw	35
Genevieve Johnsson	36
	00
Research with impact	37
Supporting the next generation of leaders	37
International engagement	
Collaborate and partner with us	40
Achieving our vision through philanthropy	41

Achieving our vision through philanthropy



Message from the Dean

Our research at the University of Sydney is solving today's biggest health problems. At this crossroads in health, our researchers are shaping the new era. Our research continues to make a real difference to people's lives because it so often transforms practice as well as forming the cornerstone of health policy. It is for all these reasons that I am delighted to celebrate our talented researchers.

The researchers showcased in this brochure have transformed our vision of health and wellbeing. They work in partnership with industry, not-for-profit organisations, government, the health sector and community networks, to ensure relevant and pioneering research.

These researchers have designed new interventions to achieve our potential for ageing productively and ageing well. They have dramatically improved the accuracy of breast cancer detection, shattered myths about rehabilitation after breast cancer treatment, designed the first effective treatments for stuttering in children, and harnessed digital platforms to revolutionise key aspects of health services and healthcare. They have influenced policy and practice relating to people living with intellectual disability, and people following acquired brain injury. Our researchers are also seeking to prevent chronic disease, particularly chronic musculoskeletal conditions, and are seeking the first cure for chronic pain.

The faculty's focus on equity and diversity inspires our work with Aboriginal and Torres Strait Islander people. Our researchers are collaborating with communities to explore interventions and supports that will close the gap in relation to health and disability.

We are investing in new research and teaching facilities to be included in a purpose-built health precinct on the University's Camperdown Campus. When the precinct is complete, we will co-locate with other health faculties to further strengthen our research and broaden our expertise.

We attract truly outstanding higher degree research students who become a critical part of our research community. It is their energy and creativity that brings our work to life. Regardless of the work you do here, you'll be encouraged to think, challenge, explore, extend yourself, and express your ideas in an environment where there is never a shortage of inspiration.

I encourage you to collaborate with us on research opportunities, study here, or support our vital work to further our research into prevention and intervention actions to improve health and wellbeing for all.

Professor Kathryn Refshauge Dean, Faculty of Health Sciences

"We attract truly outstanding higher degree research students who become a critical part of our research community. It is their energy and creativity that brings our work to life."

Physical activity, lifestyle, ageing and wellbeing

Our research promotes healthy lifestyles and wellbeing across the lifespan. We have multidisciplinary teams focusing on ageing and health, climate change and vulnerability, exercise, health and performance, living well with chronic disease, neurological rehabilitation, sports injury, sports performance and activity promotion, and work and health.

We collaborate extensively around Australia and internationally and are constantly seeking to innovate and develop new partnerships.

Our collective aim is to improve lives. Our research is conducted in a diverse range of settings (including hospitals, community, schools and residential care) and in conjunction with a variety of industry partners. Our research has been cited in numerous national and international practice guidelines and policy documents.

We're proud of our societal impact. By translating our research, we are changing lifestyles and practices of the general public, athletes, people living with chronic diseases, older people with comorbidities, healthcare practitioners and healthcare organisations.

Professor Lindy Clemson Research Leader

Older people are at higher risk of falls, which can lead to a chain of negative consequences including loss of confidence, limiting activity and injury leading to hospitalisation and death. My research focuses on developing and implementing fall-prevention programs.

My background in occupational therapy contributed to the development of three novel and effective fall-prevention programs for older people. One of these, the LiFE program, teaches older people to embed exercise in daily life. LiFE has been implemented internationally and is currently the focus of a multi-university European consortium that is adapting it for younger adults using iPhone technology. Another significant program is iSOLVE, which general practitioners are using to implement evidence-based fall-prevention strategies with their patients.

My work in dementia includes COPE, an occupational therapy and community nursing program to improve day-to-day functioning of people with dementia. We are partnering with aged care providers, local health districts and private practitioners to determine how COPE can be delivered in a sustainable way.

"The LiFE program teaches older people to embed exercise in daily life."

Professor in Ageing and Occupational Therapy

Professor Maria Fiatarone Singh

John Sutton Chair of Exercise and Sport Science

I decided to become a geriatrician when I watched my beloved grandmother suffer from psychotic depression after the death of my grandfather. Later, she had a hip fracture and failing memory and slipped between the cracks of a healthcare system ill-equipped to deal with elders with multiple comorbidities. I knew there must be a better way.

I qualified as a geriatrician in the first established fellowship program at UCLA in 1987. Over the past 37 years, I have practised clinical geriatric medicine and conducted research in exercise, nutrition and ageing.

My work always tries to inject a holistic vision of health care that is often missing from medical systems and business models. My team has conducted numerous clinical trials, dissemination and training programs in the use of exercise as medicine for chronic disease and ageing.

"My work always tries to inject a holistic vision of health care that is often missing from medical systems and business models."



Associate Professor Lee-Fay Low

I've been a researcher in the area of dementia for almost 20 years. At the moment, when someone gets diagnosed with dementia, they are told to get their affairs in order and come back in six months for follow-up. Contrast this to a diagnosis of cancer, or someone who has had a stroke; people with dementia receive no rehabilitation or support to live a good life.

I recently won an NHMRC fellowship to research rehabilitation for dementia. I'm advocating for more rehabilitation for dementia and allied health involvement in aged care services, and piloting the Dementia Lifestyle Coach program which supports people diagnosed with dementia to be active and engaged in their communities. As part of this study, we have people with dementia being paid to provide peer support to others.

I'm also working with several aged care providers to roll out LifeFul, a reablement and relationship-based care program in their facilities.



Meredith Gresham PhD candidate

As an occupational therapist (OT), my career has focussed on making a difference in older people's lives, particularly older people living with dementia, as well as the family and professional carers who provide support. OTs work to help clients achieve independence with basic activities of daily living.

One critical aspect of basic daily living is toileting – often the difference between a person remaining at home or being admitted to a nursing home. Until recently, there has been no way to automate the task of clean up. But now there is an electronic toilet seat (also known as a bidet) that washes and dries the user. Toileting is a decidedly non-glamorous area of research but one with the potential to greatly improve people's dignity and autonomy. Along with my supervisors, Associate Professor Lee-Fay Low and Professor Lindy Clemson, I've taken on the challenge of exploring bidet technology as a way of supporting older people who need help with toileting.

Associate Professor Ollie Jay

Every year, heatwaves are responsible for more deaths than all other natural disasters combined, with the elderly, economically disadvantaged, and people with cardiovascular problems among the most vulnerable. Air conditioning offers by far the greatest protection against heat-related illness in a heatwave, for those who have it. However, rising electricity prices and the greater likelihood of blackouts associated with Australia's ongoing energy concerns makes our reliance on air conditioning during heatwaves even more tenuous.

Through funding from the NHMRC, MS Research Australia, and the NSW Office of Environment and Heritage, my research team in the Thermal Ergonomics Laboratory strives to better understand the factors that influence people's ability to regulate their body temperature. We're using this information to develop evidence-based guidance for sustainable cooling strategies for the most vulnerable during bouts of hot weather.

We're also working with sporting organisations such as Cricket Australia and the National Rugby League to develop user-friendly extreme heat policies that protect participants from the risk of heat illness.



Mohammad Fauzan Bin Maideen

PhD candidate

I have always been fascinated by research that fuels evidence-based clinical practice, and improves patient outcomes by challenging what may be seen as conventional wisdom in day-to-day assumptions.

After working as a clinician and teaching academic for many years, I felt I was ready to embark on my doctoral studies and begin a long overdue research career. Choosing the University of Sydney for my PhD was an easy decision, with its stellar track record in research and academic innovation.

My PhD supervisor Associate Professor Ollie Jay has been extremely supportive and instrumental in sparking my interest in paediatric thermal physiology. He has been more like a mentor than a research supervisor. One exciting innovation we are looking at is an optimal method for non-invasively monitoring core body temperature in premature infants.

> "Every year heatwaves are responsible for more deaths than all other natural disasters combined, with the elderly, economically disadvantaged, and people with cardiovascular problems among the most vulnerable."

Musculoskeletal health

Musculoskeletal health problems include disorders of bones, joints and muscles as well as disabling genetic neuromuscular diseases. Pain and disability associated with musculoskeletal conditions can significantly affect a person's quality of life, often impairing their ability to fully participate in family, social and working life.

In Australia, one in three (6.9 million) people have a musculoskeletal condition. The economic impact is estimated at \$55 billion per year, which includes direct and indirect health costs from the loss of functional ability.

Our multidisciplinary team of musculoskeletal researchers carry out pioneering research to maintain musculoskeletal health and find solutions to prevent and treat the pain and disability associated with musculoskeletal disorders.

Our mission is to translate our research findings into clinical practice, to prevent injury and disability and cure debilitating chronic pain. Many of our researchers have been awarded competitive national and international grants to fund their innovative research. Our most recent grant recipients will conduct multi-site, cross-disciplinary projects to reduce the burden of musculoskeletal conditions such as back pain and debilitating neuromuscular disorders in Australian communities.



Professor

Jim Elliott

Research Leader Conjoint Professor of Allied Health Northern Sydney Local Health District

As a former professional baseball player with a fair share of injuries, I was forever in awe of the physiotherapists helping injured athletes return to play. However, I was frustrated when no one seemed to know why one of my career-ending injuries would not heal. Since then, I've devoted my clinical, academic and research career to understanding why some but not other people take longer to recover following a traumatic injury, specifically head and neck trauma.

Over the past 10 years, we have discovered that people injured in a car crash have profound changes in the size and shape of their neck muscles. These unique differences predict which patients will develop chronic pain. Our current work uses advanced magnetic resonance imaging techniques to identify changes in spinal cord pathways and skeletal muscles as innovative biomarkers of poor recovery. We aim to use this knowledge to develop more informed diagnostics.

I have been privileged to partner with and have my work recognised by various professional bodies throughout my career, such as the American Physical Therapy Association, North American Spine Society and the Radiological Society of North America. Our interdisciplinary collaborations around the world will ensure our pioneering work leads to new therapies permitting millions of people with acute and chronic spinal pain to live a healthy, active life.

Aimie Peek PhD candidate

In the 12 years I have worked as a physiotherapist, I have been intrigued as to why some patients recover quickly while others are left with persistent symptoms. I realised there was a need to look deeper into the neurophysiology of persistent pain conditions, specifically headache and migraine.

If we can understand why certain patients are not responding to traditional treatment approaches at a cellular level, we can better tailor treatments to their individual needs. My current research uses non-invasive brain imaging to validate a biomarker for migraine, which will hopefully improve our understanding of the condition and spur the development of new treatments.

As a physiotherapist, it is very important to produce clinically meaningful research; a vision I share with my supervisor Dr Trudy Rebbeck. I also want to expand my research to explore other pain conditions such as neck and low back pain, one of the leading causes of disability worldwide.



"Early in my physiotherapy career, it frustrated me that we often had no answers for distressed patients who presented with unimaginable pain."

Dr Trudy Rebbeck

Early in my physiotherapy career, it frustrated me that we often had no answers for distressed patients who presented with unimaginable pain. I was most concerned by the variety of failed treatments and different and confusing messages they received. Spurred on by this, I became a specialist musculoskeletal physiotherapist, a role in which I was able to provide comprehensive and targeted solutions and turn my patients' lives around.

I am driven to translate research into practice and teaching. In a recent breakthrough, we discovered different concentrations of brain neurochemicals (GABA) in people with migraine.

I have been privileged to work with industry throughout my career, such as partnering with the State Insurance Regulatory Authority since 2000. We published the first guidelines on how whiplash is managed in affected individuals. Since then, I have worked with multiple disciplines and institutions in educating clinicians, general practitioners, physiotherapists and medical specialists.

Communication sciences and disorders

The ability to communicate is central to all aspects of a person's life.

Undiagnosed or untreated, a person who has a communication or swallowing disorder is susceptible to poorer educational outcomes, reduced employment prospects and increased likelihood of social, emotional and mental health issues.

Our team focuses on evidence-based assessment and treatment options for communication and swallowing disorders in babies, children, adolescents and adults. We are known for our cutting-edge treatments for speech disorders in childhood, reading disorders, prevention and treatment of stuttering, voice disorder treatment, and the treatment of communication difficulties which can follow an acquired brain injury such as stroke, dementia or traumatic brain injury.

Some of our recent achievements include:

- launch of the Dr Liang Voice Program, following a \$10 million donation to advance the assessment and treatment of voice disorders
- a Cancer Institute NSW Future Research Leader Fellowship to Dr Kimberley Docking to work with children with brain cancer and leukaemia in conjunction with the Kids Cancer Alliance (Translational Cancer Research Centre)
- a third consecutive NHMRC Senior Research Fellowship to Professor Leanne Togher to develop communication treatments for people with traumatic brain injury and dementia. Professor Togher was subsequently awarded the NHMRC Elizabeth Blackburn Fellowship
 Clinical Award for the top ranked female Research Fellowship in Clinical Medicine and Science in 2017.



Professor

Leanne Togher

Research Leader Professor of Communication Disorders Following Traumatic Brain Injury

Over 30 years ago, as a young speech pathologist, I realised that speech pathology treatment for people with a traumatic brain injury can have a significant effect on their capacity to talk to their friends, maintain family relationships and return to work.

Since then, my academic and clinical career has been devoted to finding effective and efficient treatments for people with brain injury, and supporting their families. Recently, my research has been using the latest digital health technology advances to deliver communication treatment for the more than 50 million people worldwide who have a brain injury.

I ensure the work of my team is translated into clinical practice through my alliances as a Member of the International Brain Injury Association Board of Governors and international leader of its Social Cognition and Communication Special Interest Group, and as a contributor to the American College of Rehabilitation Medicine Cognitive Rehabilitation guidelines.

"My academic and clinical career has been devoted to finding effective and efficient treatments for people with brain injury, and supporting their families."

Maryane Gomez PhD candidate

As a busy expat clinician working in the United States, I was scrambling to prepare a treatment session for one of my first clients with childhood apraxia of speech. Initially drawn to the Kaufman Speechto-Language Protocol (K-SLP), as it was readily available at my facility, I began to realise that although the treatment approach was widely used by American speech pathologists, there was no research available to support it.

For this reason, I decided to become involved in childhood apraxia of speech research and analyse the effectiveness of the K-SLP approach.

After consulting with many researchers in Australia, I linked up with Professor Tricia McCabe at the University of Sydney, who is now my PhD supervisor. Since I enrolled in the postgraduate program, Tricia has been committed not only to helping me develop my research but to grow as a researcher.



Professor **Tricia McCabe** Professor of Speech Pathology

The very first patient I treated, when I was an undergraduate student speech pathologist, had childhood apraxia of speech and made very slow progress in therapy. Childhood apraxia of speech is a disorder that affects a person's ability to move the muscles used in speech. This experience, combined with a serious case of curiosity, lead me to develop new and effective treatments. These treatments have revolutionised how speech pathologists worldwide treat this previously intractable condition.

Of course, big change is not a one-woman show – I would not be where I am today without my students, who have contributed ideas, inspiration, hours in the clinic and their own drive to help children and families with this rare condition.

Changing practice can be challenging but our childhood apraxia of speech research website is teaching speech pathologists the basics of these new treatments. By making new treatments easy to access and learn, we are facilitating translation of our research into clinical practice and changing the lives of affected people around the world.

Page 17

Cancer diagnosis and rehabilitation

Cancer affects one in three of us. Our faculty's multidisciplinary cancer expertise uniquely positions us to make a real difference to individuals diagnosed and/or being treated for this disease. Our research is transforming knowledge and impacting upon clinical practice in areas such as early diagnosis, treatment of the disease and its side-effects, and the development of novel pharmaceuticals that can diagnose and treat cancer at the same time.

Our research is far reaching, going further than metropolitan communities into rural and Indigenous Australia and around the world.

The novelty, multidisciplinary nature and impact of our research has led to a multitude of prizes and awards, honorary fellowships and sustainable funding from government and charities within Australia and beyond.

Our international leaders in cancer research are improving diagnosis by using novel imaging techniques and new technologies. In rehabilitation, we are challenging long-held beliefs about problems arising from cancer treatment, developing better interventions, and treating the consequences of medical intervention.



Health sciences research

Professor

Patrick Brennan Research Leader

Professor of Diagnostic Imaging

I first became interested in research as a young imaging science graduate in the 1980s. It was clear that procedures for producing the best possible image at the lowest risk to the patient were not optimised, meaning accurate diagnoses could not always be guaranteed. This awareness led me to my PhD studies in Belfast in the early 1990s and to my current focus on breast cancer as Professor of Diagnostic Imaging at the University of Sydney.

My work has transformed the world of breast imaging and accuracy of diagnosis of breast cancers. I use a variety of methods, such as online interactions with radiologists around the world, artificial intelligence and eye-tracking to improve the accuracy of breast cancer identification. This is critical to prognosis.

I am co-leading an international multicentre study, where for the first time since X-rays were discovered, a radical improvement in image quality has been discovered. A world-first clinical trial will take place in 2020 using this new approach.

Robyn Sierla PhD candidate

Working as a lymphoedema therapist at Royal Prince Alfred Hospital, I was very aware that as clinicians, despite our advanced understanding of the physiology of this chronic oedema, we were still feeling our way through the dark in treating the condition. I needed a way of recording change and demonstrating treatment response for myself and for my patients. I also felt strongly that, as a profession, we needed to standardise our reporting to build a stronger evidence base.

My doctoral studies will establish consensus on a set of outcomes to report change in lymphoedema and develop and test software to digitise and standardise this process, under the guidance of Professor Sharon Kilbreath and her team. I have also received excellent supervision and support from other researchers across the University of Sydney – from Implementation Science to the School of Information Technology, all of whom provided a wealth of knowledge and support.

"I was very aware that as clinicians, despite our advanced understanding of the physiology of this chronic oedema, we were still feeling our way through the dark in treating the condition."

Professor Sharon Kilbreath

My research direction was a direct consequence of experiencing first-hand the side effects of treatment for breast cancer.

At the time I was diagnosed, there was little research about the physical impairments arising from surgery and other treatments, including chemotherapy. My friend and research collaborator, Professor Kathryn Refshauge did not bring the traditional flowers or chocolates to my bedside, but the only two studies she could find on prevention of lymphoedema, a well-known side effect of treatment for breast cancer. The need to address this knowledge gap was clear.

Before the end of my chemotherapy, my research team had expanded to include my oncologist and surgeon. This team continues to grow as we challenge assumptions about the causes of upper limb impairments following breast cancer treatment and examine interventions to prevent these impairments.

Disability and mental health

Our aim is to improve the situation for people with disability and mental ill-health in Australia and our nearest regions, so they can experience active and meaningful lives as fully included members of the community.

Researchers at the Faculty of Health Sciences achieve this objective by undertaking research that focuses on individual needs, by listening to people and learning from best practice. We strongly value individuals and collaborate with people with disability and mental ill-health to co-create research and develop high quality research evidence which reflects their experiences. Our researchers are strongly connected to practitioners and policymakers working to make change and develop better service responses to meet individual needs.

Our success is measured by the extent that we can help individuals to live well. Researchers from the Centre for Disability Research and Policy make key contributions through the application of research to important national policy developments and inquiries including the National Disability Insurance Scheme and the Royal Commission into Institutional Responses to Child Sexual Abuse.

Our faculty-based World Health Organization Collaborating Centre in Health Workforce Development in Rehabilitation and Long Term Care conducts projects such as the provision of on-theground training in community-based rehabilitation in the Pacific. This helps to develop a communitybased, locally relevant approach to rehabilitation which is more meaningful to local communities.

Associate Professor **Jennifer Smith-Merry Research Leader**

My research interests reflect my strong desire to make life better for people with mental ill-health and disability. Like most people, my life has been impacted by the mental ill-health and suicide of family members and friends, many of whom had been failed by the services and policy frameworks that should have been helping them.

I work with a multidisciplinary team as well as consumers, policymakers and service providers using a range of research methodologies. The wealth of knowledge this generates is key to understanding and solving complex practicebased problems. For example, I have been collaborating with the NSW Mental Health Commission to access coroner databases to study unintentional mental-health-related deaths. Many of the people whose stories we uncover have no next of kin and very limited social connections. I hope that by understanding the contexts of their deaths, their lives may contribute to improved services for others in similar situations and prevent future deaths.



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"I hope that by understanding the contexts of their deaths, their lives may contribute to improved services for others in similar situations and prevent future deaths."



Professor Gwynnyth Llewellyn Professor of Family and Disability Studies

What drives my research is a passion to overcome negative stereotypes about people with disabilities which prevent them being accepted as full, participating citizens in our society.

Exclusion is inequitable, unfair and unjust. The discrimination experienced by people with disabilities in all areas of their lives results in poorer education and employment opportunities and fewer economic or social resources.

At the Centre for Disability Research and Policy, we are researching inequities in health, employment, housing, violence, gender and public policy and programs across entire populations. This allows us to monitor and report on progress towards realising equity for people with disabilities and their families and, where there is no progress, develop evidence-informed policy solutions to create a fairer society for all.

Our input into the Royal Commission into Institutional Responses to Child Sexual Abuse highlighted the particular vulnerabilities of children and young people with disabilities to abuse and neglect, and informed the commission's recommendations about creating child-safe environments for all children, including those with disabilities.



Sai Soe PhD candidate

Being a Shann ethnic (minority) in a majority Burmese-dominated country (Myanmar), I'm intrigued by the idea of having universal human rights across all ethnicities and races. Inequality has been the biggest challenge in my country. It has always been an inspiration to seek and advocate for those who are voiceless in their communities.

In 2008, I started working towards the social inclusion of people affected by leprosy and came to realise how a well-informed community can significantly influence public policy discussions and development. I became a frontline activist for the rights of persons with disabilities in many different public policy discussions.

In 2013, I was awarded an Australian Leadership Award Fellowship by the Faculty of Health Sciences and the Department of Foreign Affairs and Trade. During the three weeks training, I presented a case study which focused on disability-inclusive development policy analysis. This was well received and later accepted as a doctoral research topic. I have also been awarded a full scholarship for my PhD research.

Page 25

Medical imaging

Medical imaging covers a broad range of techniques used to see the anatomy (structure) or physiology (function) of the human body and animal models of disease.

One of the greatest breakthroughs in medical imaging in the 20th century was the invention of tomographic imaging techniques that produce 3D 'slices' through the body.

These imaging techniques include computed tomography (CT), magnetic resonance imaging (MRI) and positron emission tomography (PET), each one employing various forms of electromagnetic radiation, including x-rays (CT), gamma rays (PET), radiofrequency waves (MRI), or in the case of ultrasound, high frequency sound waves.

There is an equally broad range of medical imaging applications encompassing every major health condition, including cancer, cardiovascular disease, metabolic disorders and degenerative brain diseases. Medical imaging enables population screening for unsuspected disease, diagnosis or staging of new disease, treatment planning and assessment of response to therapy.

Locally, we work with Sydney Health Partners (NHMRC Advanced Health Research and Translation Centre), a collaboration between Sydney, Northern Sydney, Western Sydney Local Health Districts and the Sydney Children's Hospitals Network (Westmead), to provide our researchers with access to more than 2.5 million people (approximately 10 percent of the Australian population) and the latest equipment.

Our researchers are best known for implementing novel strategies to reduce errors in mammographic screening, and developing advanced motion correction methods in medical imaging, awake animal imaging technology, and quantitative personalised radiation dosimetry for precision cancer treatments.

Professor

Steven Meikle

Research Leader **Professor of Medical Imaging Physics**

When my grandfather was my age (55), he had the first signs of a degenerative brain disease. Within five years he was admitted to an aged care facility and died three years later. We still don't know what type of brain disease caused his rapid decline. At the time of his death in 1969, medical imaging was very crude. Since then, CT, MRI and my area of expertise, PET, were invented and, for the first time, clinicians were able to 'see' inside the brain.

Using PET and a new generation of radiopharmaceuticals that target specific receptors in the brain, we are now able to distinguish different forms of dementia.

In my research, I collaborate with chemists, neuroscientists and engineers in academia and industry to develop ever more sophisticated imaging methods that leverage advances in diagnostics and therapeutics. Our aim is not only to know the cause of disease in an individual, but also which drug is best to arrest their decline; this is what is known as precision medicine. These solutions were too late for my grandfather but I hope they will help many others in the future.



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"Investigating breast cancer from a physics perspective, I was surprised to learn that ... a national measure of radiation dose for mammography did not exist."

Mo'ayyad E Suleiman

PhD candidate

I have had a wide ranging and successful career, but my dream has always been to work in research and academia. When my brother started his PhD at the University of Sydney, his research on breast cancer piqued my interest. Investigating breast cancer from a physics perspective, I was surprised to learn that although mammography has served us well for the last few decades, a national measure of radiation dose for mammography did not exist.

Medical imaging researchers at the University, including my PhD supervisor, Associate Professor Mark McEntee, and Professor Patrick Brennan, saw how my physics background could be applied to the topic and I joined the team. I am now in the final year of my PhD; my research has been published; I have established diagnostic reference levels for dose in mammography; and my interest has grown beyond the initial topic. I am excited to explore postdoctorate opportunities, all because of a great team that trust me and support my ideas.

Associate Professor Mark McEntee

Seeing my own hand on an x-ray at eight years of age introduced me to the world of radiation and led me down a path of science and ultimately to imaging research. Personal and professional experiences have driven me to create and disseminate evidence-based approaches to imaging, always remembering that the patient is at the centre of it all.

I am driven by the achievement of translating scientific discoveries from the lab to the classroom, to PhD research, through the profession and ultimately to an improved outcome for the patient.

I work to influence guidelines, policy and procedures from Europe to the Pacific. My significant breakthroughs include calculating actual glandular dose for women undertaking breast screening, driving radiographer reporting in Singapore, establishing certificate education for radiographers in Tonga, and creating community-led breast screening for Aboriginal women in southwest Sydney.

Aboriginal and Torres Strait Islander health

Our research focuses on Aboriginal and Torres Strait Islander health and disability issues, with the aim to improve health outcomes, promote social and emotional wellbeing and address health, educational and social inequities.

The team draws on Aboriginal and Torres Strait Islander people's knowledge, leadership and practice by working in partnership with Aboriginal and Torres Strait Islander organisations and communities. Together we identify complex problems for investigation, agree on the most culturally appropriate and rigorous research methods, interpret the results and disseminate new knowledge back to communities and policy makers.

The philosophical stance of our research is self-determination and human rights for Aboriginal and Torres Strait Islander people.

This multidisciplinary theme comprises members from all disciplines of the faculty, who work to ensure the highest ethical principles and values are embedded in our Aboriginal and Torres Strait Islander research.

Members of the research theme partner with and work alongside Indigenous communities across Australia and in other nations around the world. These relationships foster knowledge sharing and result in improvement of practice on a global scale.



Dr John Gilroy Research Leader

I was born with a profound speech impairment and mild hearing impairment related to a respiratory condition called rhinitis. I was often teased and bullied by my school peers for my disability and my Aboriginality. After high school, I worked as a volunteer in disability and ageing services.

Through this work, I became aware that disability service providers really want to be culturally inclusive for Aboriginal and Torres Strait Islander people. What was missing was Aboriginal-community-driven research. It was from this moment that I worked towards becoming a lead researcher in Aboriginal disability and health research at the University of Sydney.

There have been two big moments in my career to date. The first was being invited by an Aboriginal community-controlled organisation in Central Australia to help lead a large-scale disability research project in remote regions. The second was being invited to establish an Aboriginal and Torres Strait Islander research stream for the Centre for Disability Research and Policy.





"I am working with Aboriginal communities to better understand how to provide evidence-based care for Aboriginal and Torres Strait Islander people with chronic lung disease."

Professor Jennifer Alison Professor of Respiratory Physiotherapy

Aboriginal health disadvantage is prominent in chronic lung disease with a much higher prevalence in Indigenous Australians than in non-Indigenous Australians, and with a five times higher rate of hospitalisations. The latter is significant for Aboriginal and Torres Strait Islander people due to dislocation from family, especially if hospitals are distant from the communities in which they live. Pulmonary rehabilitation has strong evidence of effectiveness in improving health-related quality of life and reducing hospitalisations.

In my current research, funded by an NHMRC Global Alliance of Chronic Diseases grant, I am working with Aboriginal communities to better understand how to provide evidence-based care for Aboriginal and Torres Strait Islander people with chronic lung disease. The project is using a culturally specific program, Breathe Easy Walk Easy Lungs for Life (BE WELL) which aims to upskill Aboriginal health workers in their understanding of chronic lung disease and increase their ability to assess patients, and to help implement culturally appropriate pulmonary rehabilitation programs.

As Chair of the Australian Pulmonary Rehabilitation Network for the Lung Foundation Australia, I am advocating for pulmonary rehabilitation to be provided in primary care settings to enable much greater access for all people with debilitating chronic lung disease, including those in Aboriginal and Torres Strait Islander communities.

Dr Vanessa Lee

Coming from the oldest living culture, Yupungathi and Meriam nations, where we have no language word for research, I found myself marrying my Aboriginal and Torres Strait Islander cultural ways of doing, knowing and being (taught to me by my grandmother) with my western research expertise of social epidemiology in public health. Social epidemiology is research on the social issues of the burden of disease from the foundation of the social, cultural and political determinants, and in my case, of First Nations people.

My research focus for the last 15 years has involved applying my social epidemiology lens to a variety of health challenges, such as BE WELL (an NHMRC-funded project exploring best practice for lung disease in Indigenous people); a new model of care to increase Aboriginal and Torres Strait Islander women's breast screening attendance rates; identifying the political determinants of Aboriginal Community Controlled Health Services; and evaluating Indigenous core competencies in Master of Public Health programs nationally.

I'm also an advocate for Aboriginal and Torres Strait Islander social justice in health, as the first national Aboriginal and Torres Strait Islander Vice President of the Public Health Association and as a director for Suicide Prevention Australia, providing an Indigenous social epidemiological perspective to suicide prevention for all Australia.



"I found myself marrying my Aboriginal and Torres Strait Islander cultural ways of doing, knowing and being (taught to me by my grandmother) with my western research expertise of social epidemiology in public health."



eHealth and health care delivery

Our researchers are using mobile devices and health data to transform health and wellness, working across a wide variety of areas including cardiology and cancer.

We look at a range of eHealth applications including consumer-facing programs and how we can develop sophisticated clinical-decision support systems and link clinical performance with improvement and professional development using health data.

We work closely with the Australian government and industry internationally. We were recently awarded the Digital Health Cooperative Research Centre – a transformative \$229 million (including in-kind contributions) investment to improve the health of Australians and advance the economy in a first-of-its-kind digital health partnership.

In addition to researching the impact of eHealth on health care delivery, we are also working with state and federal governments to increase the capacity of the health workforce to operate in a fully digital health care system.



Professor

Tim Shaw Research Leader Professor of eHealth

> As one of the first professors of eHealth in the world, I am focussed on improving how eHealth can be used to transform health and wellness. I am inspired by working with clinicians and IT specialists at the coalface of care to improve performance and systems. I strongly believe that researchers need to work within the system to ensure their research has lasting and sustained impact.

I am particularly excited by the Digital Health Cooperative Research Centre, which provides unparalleled opportunity for the University of Sydney to be at the forefront of national eHealth programs delivered at scale.



Genevieve Johnsson PhD candidate

Having practised as a psychologist at Autism Spectrum Australia for the past nine years, specialising in early intervention for children on the autism spectrum, I have seen time and time again that early intervention can have a huge impact on a child's development.

Unfortunately, long wait lists and extensive travel times to see autism specialists are often barriers to access in rural and remote areas.

Following recommendations from the Wobbly Hub Rural Research Team at the University of Sydney, my supervision team sought to develop an accessible, collaborative, and responsive eHealth model to support people working with children with disabilities in rural communities.

My PhD is investigating an eHealth model that is tailored to deliver autism-specific training and one-to-one support to a wider audience at a lower cost.

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- sydney.edu.au/research/opportunities

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- sydney.edu.au/scholarships

Contact information:

Associate Professor Martin Mackey Associate Dean Research Education fhs.adresed@sydney.edu.au +61 2 9351 9374



University of Sydney

The

International engagement –

Our researchers are improving the quality of life and health outcomes of global communities. We collaborate with international partners and other world leaders to tackle major global health challenges.

Our researchers and research teams collaborate with universities, governments and peak international bodies around the world including Harvard University, the University of Hong Kong, Fudan University and the University of California as well as organisations such as the World Health Organization, and the Hospital for Sick Children in Toronto, Canada. A selection of our global collaborators are shown on this map.



Health sciences research

Collaborate and partner with us

The Faculty of Health Sciences is committed to making a difference to society through research. Our engagement with industry ensures we are solving major problems to enable private and public sectors to improve the lives of individuals, families and the community. We are committed to research partnerships that embody meaningful mutual collaboration to develop knowledge and innovation that will translate rapidly into practice. Partnering with us will give you direct access to leading researchers who share your goal to make the world a better place.

The health sector is changing - technology provides new opportunities as well as new challenges. Our agile researchers are creating innovative solutions to society's biggest health problems. We do this through partnerships with NSW Government Local Health Districts and Primary Health Networks, led by our Conjoint Professors of Allied Health.

Our researchers are courageous about testing new ideas. We bring disciplines together to combine multiple perspectives, make discoveries and find new ways to solve problems. We are sensitive to, and aware of, multiple diversities across our communities. Collaboration with our enduring industry partners is built on a long and successful record of training allied health professionals. As the leading Australian university for health sciences, we are the collaborators of choice.

Our researchers are building on the faculty's culture of research excellence. We are strengthening our relationships with key external partners and health professionals to ensure our research rapidly benefits both the individual as well as society, and influences national healthcare policies and global initiatives.

The Faculty of Health Sciences provides high quality research support to allow researchers to get on with the job of helping others. Our researchers are responsive to changes in the health care sector. We are passionate about what we do and it shows in our commitment and dedication to making a difference.

Contact information: Professor Joshua Burns Associate Dean Research Professor of Paediatric Neuromuscular Rehabilitation fhs.adres@sydney.edu.au +61 2 9036 7302

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Philanthropic contributions from our alumni and friends have helped us to:

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- transform breast screening for women throughout Australia and internationally
- tackle obesity and the eating habits of Australians
- treat children with neuromuscular diseases and other movement disorders.

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Your support helps us to further our research into preventative action to improve health and wellbeing for everyone.

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