Research and innovation

High quality, high impact

FACULTY OF MEDICINE

The University of Sydney

Information and contact details

Faculty of Medicine
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University of Sydney NSW 2006
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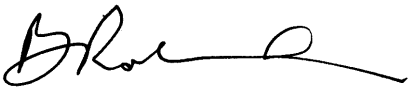
Building research capacity

Research and the acquisition of medical knowledge forms the basis of advancements in medical care.

At the University of Sydney, we want our graduates to contribute to increasing medical knowledge, and we focus on providing them with both the opportunities and skills that will allow them to play leading roles in shaping the future of research and care.

The Faculty of Medicine is the country's oldest, and one of its best, research facilities in basic and clinical sciences, and in public health. We are affiliated with outstanding researchers and research institutes, and our students have a tremendous opportunity in having access to such a diverse range of research expertise and training opportunities.

But opportunities alone are not enough. Good research training and skills are critical. We aim to ensure that our students have superior training in research methodologies, and as a result have the foundation to pursue careers in research into health problems of national and international importance.



Bruce Robinson
Dean

Professor Bruce Robinson

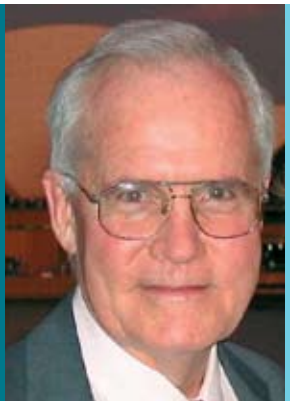
Leaders in research

The Faculty of Medicine prides itself as being the premier research-driven faculty in one of the most research-intensive universities in Australia. Our research output ranks highly internationally and translates into major advances in healthcare.

We have major research programs in cancer, genetics, fundamental and clinical neurosciences, cardiovascular disease, infection and immunity, obesity and exercise, clinical trials of new therapies and devices, public health and health promotion. Our research endeavours range across the full age spectrum from conception to senescence and different cultures in Australia and off-shore. Our activities probe normal and diseased function and span the entire spectrum from the molecular basis of disease to the public health measures to control epidemics.

We champion our collaborations within Australia and overseas, in developing countries and with countries with well-established medical research and healthcare systems. We are proud to provide leadership in translating research outcomes into better health for all.

Professor David Burke
Director of Research
Faculty of Medicine



Professor David Burke

Research snapshot

High quality, high impact, extensive, collaborative, international.

Extensive: the Faculty of Medicine, with its affiliated hospitals and institutes, forms the largest and most comprehensive coordinated group of medical researchers in the Asia Pacific region. Research is spread over more than 40 research institutes and centres and 20 campuses. The Faculty has more than 1700 academic staff and 800 higher degree research students. Research ranges from fundamental biology to public health and leadership in large international clinical trials. In 2006, total research income was $196 million.

High quality and productive: across every national research competition measure, the Faculty of Medicine ranks highly. Publications output continues to grow strongly, up a further 5% in 2007. The Faculty's success in securing competitive grants is high, with the value of National Health and Medical Research Council (NHMRC) grants more than doubling in the past five years. Australian Research Council grants have increased three-fold over the same period.

Collaborative: finding solutions to large scale health issues requires a broad approach, and the Faculty is strongly committed to boosting cross-disciplinary research and increasing collaborations with leading research institutes and universities around the world.

Researchers of world renown: many leading scientists are included among the Faculty's staff, working at the forefront of health and medical research. In recent years, increasing numbers of researchers have joined the Faculty from overseas, fostering valuable international connections and further broadening the scope of activities.

International: the Faculty encourages research programs involving international partners and other leading universities around the world. With numerous international research linkages formed by individual scientists, there is also a growing number of Faculty-wide programs supporting international collaborations. The George Institute for International Health, with its global health focus, is an affiliated research unit of the Faculty.

Research leading to improved health outcomes

The work done by the Faculty of Medicine's more than 1700 academic staff and 800 postgraduate research students is helping to improve clinical outcomes, leads to better patient care and healthier communities. Following are recent examples.

Understanding chronic heart failure

Researchers at the University of Sydney's Centenary Institute of Cancer Medicine and Cell Biology have discovered a double gene mutation that is linked with a significantly increased risk of developing chronic heart failure. The discovery goes some way to explaining why some people are at greater risk of developing heart disease than others.

The Centenary researchers found that the double gene mutation invariably led to severe heart failure and early death. Professor Chris Semsarian from the Centenary Institute says that understanding the impact of the double gene mutation may help identify those family members who are at greatest risk of developing heart disease and provide clinicians with the opportunity to initiate preventive strategies earlier in life, allowing for better disease management.

"We now have a model of severe heart failure that develops very quickly and this presents enormous potential for the development of better treatments," Professor Semsarian says.

One in ten Australians aged over 65 years develop heart failure.

New motor neurone gene discovered

Researchers from the ANZAC Research Institute, in collaboration with colleagues at Kings College London, have found a gene abnormality that causes the fatal paralysis, motor neurone disease.

The abnormal gene is only present in a small number of cases, what makes the discovery far more exciting is that the gene codes for a protein that is abnormal in all patients with motor neurone disease. ANZAC researchers believe the discovery

will initiate a new chapter in motor neurone disease research, a disease which causes the death of motor nerves than extend from the brain and spinal cord to muscles in the body.

Protection against diabetic eye disease

A major study, coordinated by the Faculty's NHMRC Clinical Trials Centre, has shown that a widely available cholesterol-lowering drug provides significant health benefits for people with type 2 diabetes. Specifically, the trial showed that the drug fenofibrate reduced the progression of diabetic eye disease and reduced its complications. Lead investigator of the study, Professor Anthony Keech from the NHMRC CTC, said the trial showed for the first time that a common lipid lowering agent could reduce the need for laser treatment in patients with or without known diabetic retinopathy.

Diabetic eye disease is the major cause of impaired vision in adults in the developed world. Laser treatments are only partially effective and can have adverse results. Access to laser treatments is also limited in many countries.

Gene discovery opens way for new brain cancer treatments

Researchers at the Kolling Institute found a series of genes that will help neuro-oncologists tailor treatments for brain cancers, potentially extending survival and improving the quality of life. Dr Kerrie McDonald and colleagues at the Kolling found five genes of high clinical significance, from which they have been developing biomarkers to enable neuro-oncologists to predict how their patients will respond to treatment and to vary the type of therapy accordingly.

Allergy breakthrough

Scientists at Westmead Millenium Institute have identified the workings of a gene which is associated with allergic diseases such as asthma and eczema. They discovered that the gene is linked to an imbalance in two types of T-cells, which is one of the hallmarks of allergy.

Professor Chris Semsarian

Researchers of world renown

Our research leaders are pushing the boundaries of scientific knowledge in a huge range of disciplines and providing students with first hand access to latest findings.

Louise Baur

Louise Baur is Professor of Paediatrics and Child Health at the Children's Hospital at Westmead. She is recognised nationally and internationally for her expertise in population health aspects of obesity, particularly paediatric obesity. With obesity a major health challenge in the developed world, her current research programs include effective management of child and adolescent obesity, management of obesity related complications, population approaches to obesity prevention, and management of insulin resistance.

Robert Baxter

Professor Rob Baxter is Director of the Kolling Institute of Medical Research. His laboratory has pioneered biochemical, cell biology and endocrine studies on insulin-like growth factors and their binding proteins – proteins implicated in the aberrant growth of many cancers and other conditions of cellular dysfunction. He is among the international leaders in IGF research with over 16,000 literature citations. He also heads the Laboratory for Cellular and Diagnostic Proteomics in the Kolling Institute, and is a fellow of The Australian Academy of Science.

David Celermajer

Professor David Celermajer is Scandrett Professor of Cardiology at the University of Sydney and Clinical Director and Group Leader, Clinical Research, The Heart Research Institute and Cardiologist at Royal Prince Alfred Hospital and the Children's Hospital at Westmead, Sydney. He has won numerous awards and prizes for ongoing contributions in his field including the Commonwealth Health Minister's Award For Excellence In Health And Medical Research, in 2002 "for outstanding lifetime achievement in health research". In 2006, Professor Celermajer was elected as a Fellow of the Australian Academy of Science. His research interests lie in the area of early detection and prevention of heart disease.

Simon Chapman

Simon Chapman is Professor of Public Health with a 30-year history in tobacco control and research. During his career, he has published more than 350 papers and written five books on tobacco control. He has won a number of national and international prizes for his research and advocacy efforts, the most recent was the NSW Premier's Award for Outstanding Cancer Researcher of 2008. From 2009, Professor Chapman will be spending more time in China having won a grant to translate some of the lessons from Australia's experience in tobacco control to address the challenge of 350 million Chinese smokers.

Tony Cunningham

Professor Tony Cunningham is Director of Westmead Millenium Institute and of the Centre for Virus Research. He is a leader in the field of viral medicine, particularly HIV and herpes viruses. The Centre for Virus Research uses the latest technologies of genomics, molecular and cell biology and protein chemistry to investigate HIV and herpes simplex viruses.

Georges Grau

Professor Georges Grau has held the Chair of Vascular Immunology at the University of Sydney since 2006. He joined the Faculty after 26 years of research in Europe, his field is pathophysiology and immunopathology with particular emphasis on cytokines and microvascular endothelium. Professor Grau has wide-ranging experience and skills in the investigation of mechanisms of inflammation. Emerging technologies have been applied to the fine analysis of the complex interactions of cells and molecules that are responsible for tissular malfunction. He also has set up multi-compartment cell culture systems to model basic pathophysiological processes relevant to diseases such as cerebral malaria, septic shock, and acute respiratory distress syndrome.

His team has demonstrated that one of the potentially major effector mechanisms of TNF and other cytokines is the release of microparticles. These membrane elements might be crucial in immunopathology, and not only in cerebral malaria. Current projects of the Vascular Immunology Unit will deal with pathophysiological events at the level of brain endothelium.

Ian Hickie

Professor Ian Hickie is the Executive Director of the Brain and Mind Research Institute and board member of the Mental Health Council of Australia. He has been a major force in the increased recognition by governments, policy makers and the health profession of the enormous impact of mental illness. His recent research has included evaluating clinical interventions in order to reduce the health burden among young people with severe mental illness. The BMRI serves as the Sydney base for major national research, education and training programs.

Gin Malhi

Professor Gin Malhi is Head of the Discipline of Psychological Medicine at The University of Sydney. He is also Executive Director of the Advanced Research Clinical High-field Imaging (ARCHI) facility at the Faculty's Northern Clinical School where he leads the newly formed CADE Clinic research unit. He has a longstanding interest in mood disorders particularly bipolar disorder and depression, and uses clinical and neuropsychological assessments in conjunction with neurobiological probes, to investigate the neural basis of affective disorders. His research has been significant in helping clinicians better diagnose complex mental health conditions and using the latest neuroimaging technology, he and his team have recently been able to identify neural markers of bipolar disorder.

Rebecca Mason

Professor Rebecca Mason is a leading Vitamin D researcher, her research has taken a number of paths including the role of Vitamin D in protecting against ultraviolet or sun damage, and the role played by Vitamin D in protecting against cancer. Research findings have shown that making Vitamin D and its further metabolism in the skin contributes to protection from damage that ultraviolet does to the skin. Within the Faculty, she is Head of Physiology and Deputy Director of the Bosch Institute.

Kathryn North

Professor Kathryn North's research focus is the diagnosis and treatment of inherited neuromuscular disorders, but she is also increasingly well known in the world of sports science. In the process of studying genes implicated in muscle disease, Professor North and colleagues at the Children's Hospital at Westmead discovered a gene which influences muscle function in athletes. A widely occurring variation of the gene is rare in sprint athletes but more common in endurance genetic athletes. For sports scientists, it was a significant finding and her work has been published widely.

Roland Stocker

Professor Roland Stocker's laboratory investigates processes related to the hardening of the blood vessels, with a focus on the oxidative processes which take place in the wall of affected blood vessels. They have successfully discovered a new class of antioxidant agents that protect against atherosclerotic diseases in animals. Their work in understanding how oxidative processes affect blood vessels and blood flow, has won international recognition and opens up the possibility of new avenues for treating atherosclerosis and related disorders.

John Thompson

Professor John Thompson is the Executive Director and Research Director of the Sydney Melanoma Unit, one of the world's largest melanoma treatment and research centres. He is the author of over 400 peer-reviewed scientific articles as well as numerous book chapters, review articles and monographs. His primary current research interests are in the fields of lymphatic mapping and sentinel node biopsy for melanoma, and regional chemotherapy techniques for limb tumours which cannot be treated surgically.

Research institutes and centres

The Faculty of Medicine's research is spread over nine schools, 20 campuses and 40 research institutes and centres. Some of the key research institutes and centres are described below.

ANZAC Research Institute focuses on ageing, with the long term goal of prolonging enjoyable, independent living for older people. Research ranges from public and population health to clinical research, using transgenic models and cell and molecular biology.

Australian Centre for Agricultural Health and Safety is assisting Australians working in agriculture to reduce the severity and incidence of occupational injury and illness.

Australian Health Policy Institute provides high-level, independent analysis of the major health policy questions confronting domestic and international health systems.

Bosch Institute brings together basic and clinical research scientists to tackle major unsolved questions about health and illness, with a focus on regenerative medicine, organ repair and transplantation.

Brain and Mind Research Institute brings together clinical and basic neurosciences research in Australia, including discovery, innovative and integrative research strategies, clinical product development and application of research initiatives. The BMRI directly benefits people whose lives have been affected by psychiatric and neurological illness.

Centenary Institute of Cancer Medicine and Cell Biology focuses on immunology and molecular medicine, and their applications to diagnosis, prevention and treatment of diseases important in developed and developing countries. The immunology portfolio includes cancer, infections, autoimmune disorders, allergies and organ transplantation. The molecular medicine portfolio includes gene therapy for genetic and haematological disorders, the genetic basis of heart disease, chronic liver disease and multi-drug resistance in cancer.

Children's Medical Research Institute conducts fundamental genetic research, seeking to understand the genes important for health and development, and the underlying causes of disease. The facility at Westmead was the first custom-built biomedical research facility in NSW.

George Institute for International Health is focused on finding solutions for major health problems through research, policy development and capacity building. It has international networks and long-term partnerships with universities, hospitals and research institutes across the globe.

Heart Research Institute targets the origins and mechanisms of the disease of blood vessels which cause heart disease and stroke.

Kolling Institute of Medical Research focuses on is molecular medicine. Programs include cancer genetics, cardiac injury and repair, neurogenetics, genetic screening, pain management and renal medicine.

National Centre for Immunisation Research and Surveillance of Vaccine Preventable Diseases carries out research and surveillance on all aspects of immunisation.

NHMRC Clinical Trials Centre is a leader in clinical trials research in Australia, coordinating its own and assisting others in conducting large-scale, multi-centre trials.

Westmead Millenium Institute of Medical Research is one of the largest medical research centres in Australia. Its researchers are leaders in basic and clinical medical research, with a "bench to bedside" philosophy aiming at translating basic research into successful clinical outcomes.

Woolcock Institute of Medical Research concentrates on research in the fields of asthma, sleep disordered breathing, chronic obstructive lung disease, environmental respiratory problems, allergy and cystic fibrosis.

Global collaborations

The Faculty of Medicine is strongly committed to increasing research programs with international partners and leading universities around the world. It is doing this in a number of ways: supporting the international links formed by individual scientists, with targeted programs, and through the George Institute for International Health.

Recent initiatives include:

- Agreements with universities in France, China, Hong Kong, Malaysia and the UK which allow the University of Sydney to jointly supervise PhD students.
- Joint research symposia held with The University of Malay and Shanghai Jiao Tong University, which lead to research partnerships.
- Exchange of course work and/or research students between Sydney and leading international universities.

The George Institute for International Health – an affliliated research unit of the Faculty – has launched research, policy and training initiatives in over 40 countries, and has established a research presence in India and China.

The Faculty is also looking to build research capacity in developing countries in the region, including in Vietnam, Cambodia and Timor Leste. www.chs.usyd.edu.au/international/

Research degrees in medicine

The Faculty of Medicine is recognised internationally for the quality of its teaching and research, and attracts higher degree students from around the world. Research students come from a range of first degrees, and include medical and non-medical backgrounds.

There are over 800 research students studying for postgraduate degrees in Medicine, mostly PhD candidates. Their research includes a wide range of disciplines and research areas including:

- Neuroscience and Mental Health
- Public Health, Epidemiology and Biostatistics
- International Health
- Cancer
- Cardiovascular and Respiratory Diseases
- Infectious Diseases, Immunology and Bio-Terrorism
- Healthy Ageing
- Developmental Biology and Reproductive Health
- Gene Therapy and Functional Genomics
- Molecular and Cellular Biology and Proteomics
- Clinical Trials
- Renal Diseases
- Paediatrics

Degrees offered include Doctor of Philosophy, Master of Philosophy, Doctor of Public Health and Master of Surgery (Research).

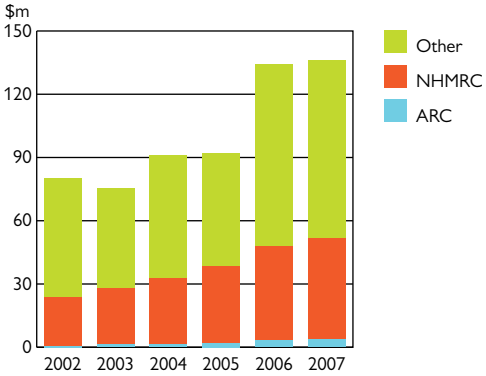
Prospective students can search an interactive online database, Research Supervisor Connect, to find projects and supervisors at http://www.usyd.edu.au/research/opportunities.

Research facts and figures

Research income 2002 onwards

The University of Sydney is one of Australia's leading institutions in attracting funding for research and the Faculty of Medicine is responsible for a significant proportion of this money. The Faculty's total research income has more than doubled from 2002 to 2007.

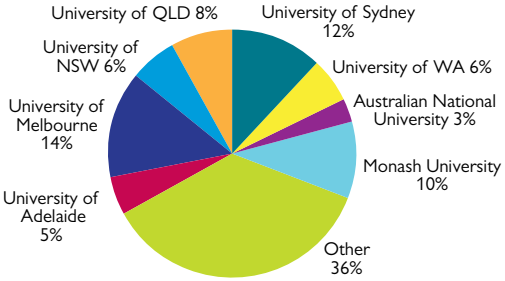
Faculty of Medicine research income 2002–2007



The National Health and Medical Research Council's (NHMRC) competitive grant schemes are a significant source of funding for the Faculty and there has been a steady increased in the value of income from NHMRC over the last 5 years. Our success is reflected in the outcomes of the 2007 round of project grants with a success rate of 29%, well above the national average. Researchers in the Faculty of Medicine were awarded a record 69 new Project grants commencing in 2008.

The value of NHMRC grants awarded to the University has doubled since 2002 and almost all of this money comes to the Faculty of Medicine. In 2008, it will be approximately 69 million, up from $55 million in 2006.

National share of NHMRC grant income 2008

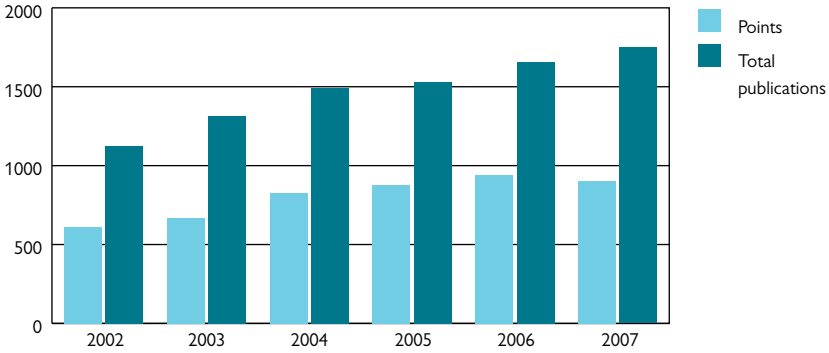


Research publications

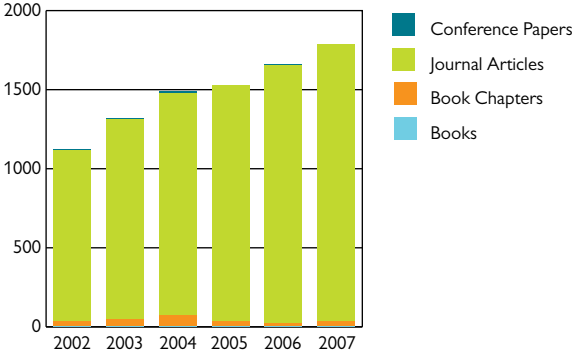
The University of Sydney has one of the highest levels of research publications output nationally and this has increased by 70% since 1996.

The Faculty of Medicine is responsible for a significant proportion of this research output and has steadily increased the number of research publications by its members, more than tripling its publications output since 2000.

Total count and weighted research publications 2002–2007



Research publications 2002–2007



Building future research capacity

World class science and education requires world class infrastructure, and across a number of campuses, the University of Sydney is building on its existing teaching and research capacity. The new and upgraded interdisciplinary facilities will foster productive interaction of researchers through co-location, collaboration and co-operation.

Sydney ARC – biomedical precinct

Detailed planning is underway for the University of Sydney's new biomedical precinct, to be known as the Sydney ARC. The initial research focus will be on cardiovascular disease and predisposing metabolic conditions, including obesity, with additional research groups to support national and international health care needs. When completed, the Sydney ARC will have the capacity to accommodate 5000 research staff and postgraduate students, and be the large such facility in the country.

The Kolling Building – new research and education at Royal North Shore Hospital

The new ten-storey research and education building located on the campus of Royal North Shore Hospital is a joint venture between the University of Sydney and NSW Department of Health and Ageing. It accommodates 500 research and teaching staff.

Westmead – a new research hub

The Westmead Medical Institute, Children's Medical Research Institute and the Childrens Hospital at Westmead are collaborating to develop plans on a large shared research facility located within the Westmead Hospital precinct. The planned facility of 15,000 square metres will accommodate dental and medical clinical teaching, administration, meeting, conference, visiting academics, as well as wet and dry research areas.

Members of the Faculty of Medicine who have been elected as fellows of the Australian Academy of Science.

Allen, David Grant, PhD, FAA
Year of election: 2006

Armstrong, Bruce Konrad, AM, DPhil, FAA, FAFPHM, FRACP
Year of election: 2000

Basten, Antony, AO, DPhil, FAA, FRACP, FRCP, FRCPA, FTSE
Year of election: 1992

Baxter, Robert Charles, DSc, FAA, FAACB
Year of election: 2004

Bennett, Maxwell Richard, AO, DSc, FAA
Year of election: 1981

Burke, David James, AO, MD, DSc, FAA, FRACP, FTSE
Year of election: 1995

Celermajer, David Stephen, PhD, DSc, FAA, FCSANZ, FRACP
Year of election: 2006

Chalmers, John Philip, AC, PhD, Hon MD (FUSA, Qld, NSW, Syd), Hon FRACS, Hon FRCP, HonFRCP(Glasgow), Hon FRCPEd, FAA, FRACM, FRACP
Year of election: 1987

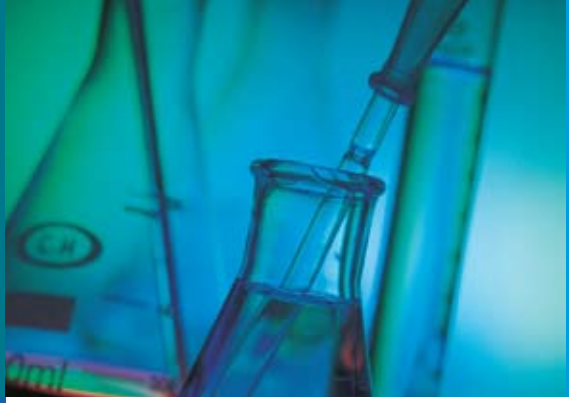
Cook, David Ian, PhD, FAA, FRACP
Year of election: 2004

McLeod, James Graham, AO, DSc, FAA, FRACP, FRCP, FTSE
Year of election: 1981

Stone, Jonathan, DSc, FAA
Year of election: 1984

Sullivan, Colin Edward, PhD, FAA, FRACP
Year of election: 1997

Tam, Patrick Ping Leung, FAA, FIBiol
Year of election: 2008



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