At the University of Sydney Medical School we are dedicated to improving health outcomes through excellent research, creating new knowledge, and fostering research translation and innovation at the highest level.

The research we do today is the health care of tomorrow. We have a large research portfolio that crosses the spectrum from basic science to the genetic causes of disease, clinical medicine and public health campaigns that save millions of lives. Together with our research partners in affiliated hospitals and research institutes, we are contributing to greater understanding of human health, translated into improved health care.

One of our most essential roles is to provide high-quality research training and skills to our large cohort of research students. Each year, we graduate more than 200 PhD students who have studied subjects ranging from the biological causes of disease to health policy, all supervised by outstanding and committed people in our schools and associated institutes.

Our graduates play leading roles in health fields around the world and our research investigates diseases that affect millions of lives, including cancer, obesity, chronic diseases, neurosciences and mental health, infectious diseases, and lifespan health.

PROFESSOR BRUCE ROBINSON
Dean

RESEARCH AT SYDNEY MEDICAL SCHOOL

Sydney Medical School is the most research-intensive faculty of the University of Sydney, extending from basic science to clinical medicine and public health. Our research strengths encompass five main health areas, all led by internationally acclaimed researchers and clinicians.
Reducing risk, improving detection, better patient care and increasing survival.

Sydney Medical School’s cancer researchers cover the spectrum from fundamental cell biology, which sheds light on cancer initiation, to cancer control and survival.

Our researchers run major programs looking at the causes of cancer, including the impact of cancer-causing agents such as chemicals, radiation, viruses and human behaviour. The school also runs programs examining biological factors that can reduce or increase cancer risk, such as inflammation and DNA damage.

The University’s cancer research programs focus on clinical and translational excellence. Our current National Health and Medical Research Council grants highlight cancer prevention and screening, cancer genetics, and the development of new drug, cell and radiation treatments, with application in a wide number of cancers including leukaemia, melanoma, cervical, liver and breast cancer.

RESEARCH HIGHLIGHTS

– Professor Graham Mann and his team are internationally recognised for their work on mapping and isolating new genetic risk factors for melanoma, a disease that kills about 2000 Australians annually and takes a disproportionately high toll on young adults.

– In partnership with the Northern Sydney Cancer Centre, we are leading a world-first clinical trial using a GPS-like tracking system to improve prostate cancer radiotherapy treatment. The approach could see cancer patients cured with radiation in just one to two weeks of treatment with very low side effects.

– Our researchers are fundamentally advancing our understanding of ageing and cancer by demonstrating the structure of active chromosomal telomeres and the role of the alternative pathway for telomere lengthening.

– Researchers in the School of Public Health led the world in tobacco control. Evidence they gathered to support plain packaging of cigarettes was highly instrumental in introducing Australia’s pioneering plain packaging legislation, which has helped reduce smoking rates in Australia to their lowest ever levels. The legislation has also been adopted by a number of other countries around the world.
**OBESITY, DIABETES AND CARDIOVASCULAR DISEASE**

Better prevention and treatment of obesity, diabetes and cardiovascular diseases, with medical and lifestyle approaches.

Sydney Medical School’s obesity, diabetes and cardiovascular disease research programs include basic biology, clinical medicine and policy research into the most effective ways of containing risk factors.

We have a number of world-leading programs in the causes, prevention and treatment of heart and vascular disease, and in preventative public health measures.

The Charles Perkins Centre is a $385 million research and education facility at the University of Sydney dedicated to reducing the impact of obesity, diabetes and cardiovascular disease. The centre brings together research groups from the enabling sciences, biomedical sciences, bioinformatics, clinical research, clinical trials and health policy.

**RESEARCH HIGHLIGHTS**

- Professor David Celermajer’s research on early detection of cardiovascular disease has included the discovery of endothelial function testing by non-invasive ultrasound, enabling the detection of vascular disease in children and young adults. This methodology has since been used by hundreds of research groups worldwide to diagnose and treat early atherosclerosis.

- A major clinical trial involving University of Sydney researchers changed practice by showing that the drug fenofibrate reduced the risk of amputation and need for retinal laser treatment in people with diabetes. The Therapeutic Goods Administration subsequently approved fenofibrate in diabetic retinopathy.

- A home-visiting program to new mothers in China, supported by Sydney Medical School, remains the only successful intervention, internationally, in preventing obesity in early life. The program also forms part of the Early Prevention of Obesity in Childhood (EPOCH) prospective meta-analysis of obesity prevention trials in Australia and New Zealand.

- In a world-first, University of Sydney and University of Washington affiliate scientists have collaborated successfully to grow heart muscle cells in sufficient quantity to repair the damaged heart of a primate after myocardial infarction. The significant breakthrough is a major step towards solving the growing epidemic of chronic heart failure, which kills more than 20,000 Australians annually.

**INFECTION AND IMMUNITY**

Reducing the global impact of infectious diseases through research, capacity building and expert advice.

Sydney Medical School has expertise in infectious diseases and immunological conditions, with cutting-edge programs in HIV, influenza, tuberculosis and malaria, as well as immunopathology and the mechanisms of inflammation.

Other areas of expertise include epidemic viral diseases, infections of animal origin, multi-drug resistance, and vaccine and drug development.

The University of Sydney’s Marie Bashir Institute for Infectious Diseases and Biosecurity is a national, Asia-Pacific and global leader in the field of infectious diseases and biosecurity. It brings together world-leading research and expertise across a wide spectrum of disciplines to increase capacity to detect and respond to infectious disease outbreaks in humans and animals.

**RESEARCH HIGHLIGHTS**

- The Centre for Research Excellence into Critical Infections, led by Professor Jon Iredell and based at Westmead Hospital, has developed new rapid diagnostic tests which allow antibiotic treatment to be provided quickly to people in severe sepsis, dramatically reducing mortality of those with critical infections.

- Our researchers informed clinical practice guidelines relating to the use of intravenous immunoglobulin in suspected or proven neonatal sepsis. This international neonatal immunotherapy study saves the Australian health system $1 million a year.

- The research of Professor Warwick Britton and his team at the affiliated Centenary Institute include programs to decrease the incidence of tuberculosis through: early recognition and treatment to reduce transmission; development of new vaccines; understanding the influence of genetic factors impacting its development; and developing biological markers which not only help discriminate between active infectious and latent non-infectious tuberculosis, but also help monitor the response to antibiotic therapy.
NEUROSCIENCE AND MENTAL HEALTH
Understanding the brain and nervous system, and converting discovery into treatment.

Sydney Medical School’s research into neuroscience and mental health spans the structure and function of the brain, spinal cord, peripheral nerves and muscle.

The Sydney Neuroscience Network brings together a pan-university, multidisciplinary team of researchers dedicated to pursuing and developing collaborative research projects in neuroscience and mental health research and teaching across the University of Sydney.

It unites experts in genetics, biochemistry and physiology, as well as pharmacology and pathology, and includes all relevant faculties and affiliated teaching hospitals and institutes.

RESEARCH HIGHLIGHTS

– Research by the International Multiple Sclerosis Genetics Consortium – led in Australia and New Zealand by the University of Sydney – identified more than 50 genetic variants associated with developing multiple sclerosis. Further work extended “MS genes” to 110, refined previous associations and defined genetic overlap with other autoimmune disorders.

– Professor Ian Hickie and his team’s research into the use of e-mental health services by young Australians to manage anxiety and depression is giving young people the power to improve their own wellbeing and protect themselves from lifelong mental health problems.

– Professor Tim Lambert and colleagues at the Concord Centre for Cardiometabolic Health in Psychosis are assessing the scope and severity of physical health problems in people with severe mental illness. Their research aims to identify the risk and protective factors that could be used to predict those who are most likely to develop life-limiting physical illnesses, such as cardiovascular disease, and develop ways to determine who is most likely to benefit from early intervention.

– Professor of Psychiatry at Royal North Shore Hospital Gin Malhi has developed scans that detect early signs of depression and anxiety in young teenagers, before symptoms are apparent.
LIFESPAN RESEARCH

A whole-of-life approach to health and medical research.

Sydney Medical School’s lifespan focus brings together clinicians and researchers working from one extreme of life to the other. We have specialists from antenatal medicine, neonatology, paediatrics and adolescent medicine through to geriatrics.

Each stage of life presents opportunities for interventions that save lives, establish healthy behaviours, and ensure age-appropriate management of chronic illness. Our multidisciplinary approach leads to research that improves outcomes at some of the most vulnerable stages of life.

Current highlights include: the study of maternal-to-child transmission of viruses, biological changes during puberty and their effect on adolescent behaviour, and stroke management in the frail and elderly.

RESEARCH HIGHLIGHTS

- A global collaboration involving Sydney Medical School researchers established that low-dose aspirin reduced the risk of pre-eclampsia in pregnancy for at-risk mothers.
- A major randomised trial involving University of Sydney researchers established the benefits of blood pressure lowering for the prevention of recurrent stroke, irrespective of the presence or absence of hypertension. These results were subsequently incorporated in all major guidelines, and have altered clinical practice worldwide.
- The first systematic international review of childhood vaccinations led by researchers from the University of Sydney found no evidence of a link to the development of autism or autism spectrum disorders.
- Professor Elizabeth Elliott’s research into Fetal Alcohol Syndrome Disorder (FASD) has included studies on the incidence of FASD; knowledge and attitudes of health professionals and women regarding alcohol use in pregnancy and FASD; services and treatments for FASD; birth defects associated with alcohol exposure in utero; and evaluation of educational materials for health professionals and communities. Professor Elliott was the chief investigator on the Lililwan project, the first major assessment of the impact of FASD in Aboriginal communities.
RECENT HIGHLIGHTS

LATEST ACHIEVEMENTS
– The University of Sydney won more than $65 million in the latest round of National Health and Medical Research Council (NHMRC) grants, which represents more than 12 percent of the national share.
– Sydney Medical School was the highest funded institution for clinical science research for NHMRC new program grants in 2014.
– We have more than 1100 higher degree research students and more than 1600 active researchers.

GLOBAL RANKINGS
Our performance in national and global rankings reflects our status as a leading medical school:
– 19th in the medicine category of the 2014-15 QS World University Rankings
– 25th in the clinical, pre-clinical and health category of the Times Higher Education World University Rankings 2013-14
– at the highest level (5) in the Excellence in Research for Australia ratings for public health and health services.

OUR RESEARCH STRENGTHS ARE SUPPORTED BY A RANGE OF ENABLING DISCIPLINES

CLINICAL RESEARCH
– Imaging
– Medicine
– Surgery
– Paediatrics
– Sleep medicine
– Addiction medicine
– Anaesthesia
– Clinical ophthalmology
– Ear, nose and throat
– Emergency medicine
– General practice
– Intensive care
– Psychiatry
– Obstetrics and gynaecology

MEDICAL SCIENCES
– Physiology
– Pathology
– Anatomy and histology
– Pharmacology
– Molecular biosciences
– Brain and mind sciences
– Genetics

PUBLIC HEALTH
– Biostatistics
– Indigenous health
– Global health
– Rural health
– Clinical trial design
– Bioethics
– Health promotion
– Health economics
– Epidemiology
RESEARCH PARTNERS AND COLLABORATIONS

Sydney Medical School produces high-impact research that addresses the most important global health issues in our areas of research strength. Our multidisciplinary research approach brings together the complementary expertise of the University of Sydney’s faculties, centres and institutes with that of our major affiliated teaching hospitals, affiliated institutes and international research partnerships.

SYDNEY MEDICAL SCHOOL
Clinical schools based at major affiliated teaching hospitals include:
– Royal Prince Alfred Hospital
– Royal North Shore Hospital
– Westmead Hospital
– Children’s Hospital at Westmead
– Concord Hospital
– Nepean Hospital
– Sydney Adventist Hospital
– Dubbo Base Hospital
– Orange Hospital
– Lismore Hospital
– Broken Hill Hospital

FACULTIES AND SCHOOLS
– Sydney School of Public Health
– School of Medical Sciences
– Faculty of Dentistry
– Faculty of Engineering and Information Technologies
– Faculty of Health Sciences
– Faculty of Nursing and Midwifery
– Faculty of Pharmacy
– Faculty of Science
– Faculty of Veterinary Science

CENTRES AND INSTITUTES
– Boden Institute
– Brain and Mind Research Institute
– Bosch Institute
– Charles Perkins Centre
– Centre for Values, Ethics and the Law in Medicine
– Marie Bashir Institute for Infectious Diseases and Biosecurity
– NHMRC Clinical Trials Centre
– Poche Centre for Indigenous Health
– Save Sight Institute

AFFILIATED MEDICAL RESEARCH INSTITUTES
– ANZAC Research Institute
– Centenary Institute
– Children’s Medical Research Institute
– Chris O’Brien Lifehouse
– George Institute for Global Health
– Heart Research Institute
– Melanoma Institute of Australia
– Westmead Millennium Institute
– Woolcock Institute of Medical Research

INTERNATIONAL RESEARCH PARTNERSHIPS
Sydney Medical School has a wide international network and more than 40 percent of its publications have international collaborators, including:
– Chinese University of Hong Kong
– Cornell University, United States
– Eijkman Institute, Indonesia
– Harvard University, US
– Hong Kong University
– Imperial College London, UK
– Johns Hopkins University, US
– Karolinska University, Sweden
– National University of Singapore
– Peking University, China
– Shanghai Jiao Tong, China
– University of Auckland, New Zealand
– University of Cambridge, UK
– University of Chile
– University of Indonesia
– University of Otago, NZ
– University of Oxford, UK
– University of Sao Paulo, Brazil
– University of Toronto, Canada

RESEARCH TRAINING

Sydney Medical School offers two research degrees for medical and non-medical graduates:
– Master of Philosophy (MPhil)
– Doctor of Philosophy (PhD)
The Master of Surgery (by research) is available for medical graduates only.

The research masters and doctoral degrees have two purposes: one is to prepare a substantial piece of work that represents a significant contribution in a particular field of study; the other is to train candidates in general research methodology and equip them with transferable research skills.

Listen to some of our current researchers speak about their experiences at sydney.edu.au/medicine
For more information about our research degrees and how to apply, visit sydney.edu.au/medicine/future-students/research

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