

Excellence through collaboration

2009/10

AMREP ANNUAL REVIEW

The Alfred Medical Research & Education Precinct

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ABOUT AMREP

The Alfred Medical Research and Education Precinct (AMREP), located on the site of The Alfred hospital, is a highly successful research and educational partnership between

- Alfred Health
- Monash University
- Baker IDI Heart and Diabetes Institute
- Macfarlane Burnet Institute for Medical Research and Public Health (Burnet Institute)
- La Trobe University
- Deakin University



AMREP Progress

AMREP has achieved an enormous amount since it was formally established in 2002 with the opening of new buildings for the Baker and Burnet Institutes, laboratories for Monash and The Alfred, and a central shared library, education centre and small animal facility.

Since then, research activity at AMREP has flourished, and research staff and student numbers have grown substantially due to institute mergers and the arrival of new groups. Some outstanding new initiatives have been launched; these include Nucleus Network (Australia's leading clinical research organisation specialising in the conduct of early phase clinical trials), the Australian Centre for Health Innovation (health technology evaluation and simulation education services), and the National Trauma Research Institute.

The completion in early 2010 of the new \$200 million facility known as The Alfred Centre that is shared by all AMREP partners is the latest achievement of this successful collaboration.

Research Themes

The major research focus at AMREP is on the key clinical themes of

- Cardiovascular disease and diabetes
- Infectious diseases and immunity
- Trauma and critical care
- Blood diseases and cancer

These themes are underpinned by excellence in

- Biomedical science
- Global and public health
- Health services research and innovation

Research programs are conducted in many other clinical areas, including mental health, neurosciences, respiratory medicine, surgery, rheumatology and gastroenterology. The 2009 AMREP Research Report (www.alfredhealth.org.au/publications) and the Annual Reports of the AMREP partners provide details of current research programs and recent achievements.



REPORT OF CHAIR, AMREP COUNCIL

Andrew Way
Chief Executive, Alfred Health
Chair, AMREP Council

Both within Australia and internationally, much is being said of the benefits of Academic Health Centres. The virtuous spiral of healthcare delivery, education of clinical professionals and clinical research all enhancing each other to the benefit of patient care and clinical outcomes is becoming well reported. AMREP, established in 2002, is Australia's first and longest existing example of such an endeavour, although when created no one at the time would have thought – Academic Health Centre. The collaboration between The Alfred hospital and its multiple academic partners is well established and has achieved much, most notably the recent development of a new \$200m facility known as The Alfred Centre that is shared by all AMREP partners. In this way and in others, AMREP through its governing council, has substantially increased the accommodation of our clinical and academic partnerships.

With such history comes the opportunity to reinvigorate what has been so successful. The AMREP Council has set on a path that will put the clinical, educational and research agendas of our institutions at the forefront of decisions we make. We are creating a leadership focused on the key clinical themes of research that can be recognised as making a national and international contribution

- Heart Disease and Diabetes
- Blood Diseases and Cancer
- Infectious Diseases and Immunity
- Trauma and Critical Care

These themes will be underpinned by the strengths and leadership of AMREP in

- Biomedical Science
- Global and Public Health
- Health Services Research and Innovation

We expect to further build on our strengths, create new themes and involve the majority of researchers on our campuses in these key strategic themes as they develop.

These changes are being undertaken with an eye to the future. For AMREP to retain its pre-eminent position in Australian academic medical and clinical life, it must continue to evolve to ensure that the Australian health consumer and the health sector (clinicians, administrators, researchers and educators) continue to view AMREP in high esteem, similar to the way the Americans regard the Mayo Clinic and the Johns Hopkins Medical Centre. AMREP must be seen as providing the best healthcare and accelerated bench-to-bedside research via strategic technological uptake and drug discovery. While coordination of research themes across diverse organisations is a major step, it is an evolutionary one for AMREP, already unified with a demonstrable capacity to deliver major outcomes.

The AMREP Council will now go about setting goals for the future in relation to

- The identification of new knowledge that improves the health of patients and populations
- Reducing the time taken to translate research knowledge into clinical practice
- Providing clinical services that deliver the lowest Hospital Standardised Mortality Rates for patients
- Educating the next generation of clinical professionals and clinical and scientific researchers

Research Performance in 2009

AMREP's research performance showed impressive growth in 2009. Revenue from external research funding increased from \$83 million in 2008 to nearly \$91 million. Of this, we received \$43.8 million from the National Health and Medical Research Council (NHMRC) and US National Institutes of Health (NIH). The number of journal articles published by AMREP staff rose from 1,051 in 2008 to 1,106 in 2009.

Funding and Award Success

AMREP researchers continued their success in attracting major competitive research grants and prestigious awards. These are some of the highlights.

Professor Murray Esler of Baker IDI was awarded the State's top science prize, the Victoria Prize, in July 2009 in recognition of his outstanding research over more than three decades that has changed the way heart failure, stress and blood pressure are treated.

The NIH awarded \$US50 million for ASPREE, the largest international trial it has ever funded. The ASPIrin in Reducing Events in the Elderly trial, to be conducted in the US and Australia, will determine whether the potential benefits of low dose aspirin outweigh the risks specifically for people aged 70 and over. Principal investigator of the Australian component is Professor John McNeil, Head of the Monash University School of Public Health and Preventive Medicine.

AMREP researchers were successful in gaining \$41 million in new NHMRC grant funding starting in 2010. Major highlights were an Australia Fellowship awarded to Professor Shaun Jackson (Australian Centre for Blood Diseases), a \$5.4 million Program Grant to Professor Henry Krum (Monash Department of Epidemiology and Preventive Medicine), 2 Centres of Research Excellence (to Baker IDI and Burnet), 28 new Project Grants and 11 Research Fellowships. Associate Professor Josephine Forbes (Baker IDI) received the top-ranked Career Development Award and the Commonwealth Health Minister's Award for Excellence in Health and Medical Research.

The Australian Research Council (ARC) introduced the Future Fellowships scheme to provide outstanding mid-career researchers with incentives to conduct their research in Australia. In the inaugural funding round for 2009, three AMREP scientists were awarded these prestigious fellowships: Professor Karlheinz Peter and Dr Julie McMullen of Baker IDI, both also receiving NHMRC Research Fellowships; and Dr Amanda Gavin of the Burnet Institute.

Promotion of Research at AMREP

Research from across all of AMREP is showcased each year in the Research Poster Display, held each October as part of Alfred Week celebrations. The 2010 display attracted 175 posters. Prizes, donated by the AMREP partners and external sponsors, are awarded for the posters judged to be the best in various categories including mental health, cardiovascular disease, infectious diseases, allergy and allied health.



Professor Shaun Jackson (Australian Centre for Blood Diseases) was one of ten recipients of a 2010 NHMRC Australia Fellowship.

The research prize ceremony, which includes presentation of the poster prizes, is a popular event held at the end of Alfred Week. In 2010, Professor Ingrid Winship, Executive Director Research, Melbourne Health, delivered a stimulating keynote address entitled 'The future of clinical research in Victorian hospitals'. The 2010 AMREP Research Prize was awarded to Dr Andrew Davies (Intensive Care Unit, The Alfred). This annual prize is awarded to the AMREP first or senior author whose original research paper was published in the previous year in the journal with the highest impact factor. Dr Davies' article entitled 'Extracorporeal membrane oxygenation for 2009 influenza A (H1N1) acute respiratory distress syndrome' was published in the *Journal of the American Medical Association* (2008 impact factor: 31.718).

Putting the 'E' in AMREP

Whilst concentrating on research has brought considerable success, as I have outlined above, much of this would not have been possible had individual researchers not learnt how to develop research proposals or plan and undertake research. Together with mapping our educational activity across Alfred Health and Monash University, AMREP has started to reprofile and prioritise the often forgotten contribution made every day by teachers and clinicians alike.

Completion of Stage 2 of the Alfred Centre

The first stage of the Alfred Centre, a healthcare facility delivering short-stay elective surgery and diagnostic procedures, opened three years ago on a high-profile site on the corner of Punt Road and Commercial Road, Melbourne. The highly innovative design incorporated provision for future expansion, later to be known as Alfred Centre Stage 2.

Stage 2, a 17,000 square metre project adding four storeys to the top of the existing building and eight storeys to its southern side, was completed in early 2010. The expansion was a collaborative AMREP initiative driven by the need for further clinical facilities and operating theatres for Alfred Health, new education and office space for Monash University, and laboratories and other facilities to accommodate additional staff and activities resulting from the mergers of AMREP's two medical research institutes with smaller institutes.

The extensive, new state-of-the-art research facilities include the Burnet Institute's nine PC2 laboratories, PC3 facility and X-ray crystallography suite, and Baker IDI's Healthy Lifestyle Research Centre, which incorporates a research gymnasium.

New AMREP Lecture Theatre

Plans are under way for construction of a 220 seat lecture theatre in the central AMREP courtyard between Baker IDI and the Burnet Tower. The new theatre, to be integrated with the current AMREP Lecture Theatre and classroom complex, will have a frontage to Commercial Road to allow access by members of the public. Building is expected to begin in 2011. This facility is possible through the generous support of The Alfred Whole Time Medical Specialists (WTMS) Trust, and we are extremely grateful for their support.

The AMREP Council

The AMREP Council has a major governance role in providing the infrastructure and environment in which research at AMREP can flourish.

Membership of the Council comprises two representatives from each of the four founding AMREP partners and one from each of the newer partners (Deakin University and La Trobe University). Additional members are the Chief Medical Officer and Chief Nursing Officer, Alfred Health (representing the interface between research and clinical practice), the Chairs of the Alfred Human Research Ethics Committee, the AMREP Animal Ethics Committee and the AMREP Scientific Advisory Committee.

Members

Andrew Way (Chair)
Alfred Health

Professor Graeme Ryan (to December 2009)
Alfred Health

Professor Steve Wesselingh
Monash University

Professor Napier Thomson / Professor Hatem Salem
Monash University

Professor Garry Jennings
Baker IDI Heart and Diabetes Institute

Hilary Bolton
Baker IDI Heart and Diabetes Institute

Professor Brendan Crabb
Burnet Institute

Professor Mark Hogarth
Burnet Institute

Professor Mari Botti
Deakin University

Professor Karen Dodd
La Trobe University

Dr Lee Hamley
Chief Medical Officer, Alfred Health

Associate Professor Sharon Donovan
Chief Nursing Officer, Alfred Health

Professor John McNeil
Chair, The Alfred Human Research Ethics Committee

Professor Geoff Head / Dr Robert Andrews (to June 2010)
Chair, AMREP Animal Ethics Committee

Professor Mark Cooper
Chair, AMREP Scientific Advisory Committee

In attendance

Heather Gallichio (Secretary)
General Manager, Alfred & Baker IDI Research Office

Gillian Holley
Manager, Monash University Central Clinical School

Bill O'Shea
Alfred Health Corporate Counsel

Geoff McDonald
Director, Capital and Infrastructure, Alfred Health



Scientists in the Metabolomics Laboratory at Baker IDI.

AT AMREP

Institutions, Schools and Major Centres located at AMREP



The Alfred

Chief Executive: Andrew Way

The Alfred was founded in 1871 and is Victoria's oldest hospital. Today, The Alfred is recognised as an international pacesetter – a progressive healthcare facility at the forefront of developments in acute care, medical research and healthcare teaching. As a major tertiary referral hospital, it provides the most comprehensive range of specialist acute health and mental health services in Victoria. The Alfred is part of Alfred Health along with Caulfield and Sandringham Hospitals.

Home to one of the busiest emergency and trauma centres in the country, The Alfred also has one of the largest and most advanced intensive care units in the region. The Alfred is the designated state-wide service provider for heart and lung replacement and transplantation, cystic fibrosis, major trauma, burns, HIV/AIDS, haemophilia, sexual health, hyperbaric medicine and psychiatric intensive care.

In addition, the hospital offers state-wide elective surgical services through the Alfred Centre, which provides short-stay elective surgery, diagnostic procedures and other planned services.

Research is a key priority at The Alfred, with internationally recognised research programs in anaesthesia, intensive care, infectious diseases, respiratory medicine, allergy and clinical immunology, cardiovascular medicine, trauma, mental health and neurosciences.

www.alfred.org.au



Baker IDI Heart and Diabetes Institute

Director: Professor Garry Jennings AM

Baker IDI Heart and Diabetes Institute (Baker IDI) is an independent, internationally renowned medical research facility whose work extends from the laboratory to wide-scale community studies with a focus on diagnosis, prevention and treatment of diabetes and cardiovascular disease.

Baker IDI's main laboratory facilities at AMREP are complemented by a national network that includes a research facility in Alice Springs dedicated to indigenous health, and a preventative health laboratory in South Australia that focuses on nutrition and community intervention research.

The institute's five research themes include Population Studies and Profiling, Metabolism and Obesity, Diabetic Complications, Vascular Biology and Hypertension, and Cardiology and Therapeutics. Each theme supports groups of scientists who work in a laboratory setting, as well as epidemiologists, clinicians and public health professionals. This research program integration is central to Baker IDI's strategy to perform research that is directly informed by community needs and to translate discoveries into everyday clinical practice.

Baker IDI has a strong presence in healthcare, which includes a multidisciplinary, evidence-based Specialist Diabetes Clinic, diabetes education, and a world-class Healthy Hearts Clinic providing cardiovascular disease risk assessments to the community.

www.bakeridi.edu.au



Institutions, Schools and Major Centres located at AMREP

The Burnet Institute has international health programs in many developing countries.



Burnet Institute

Director: Professor Brendan Crabb

The Burnet Institute is a leading Australian medical research and public health organisation focused on improving the health of disadvantaged and marginalised groups. Burnet's culture links innovative discovery-oriented research with development and humanitarian action. World-class laboratory and field-based research is integrated into multidisciplinary programs to prevent, detect and treat diseases of global significance. This allows the institute to make a tangible and sustainable impact on health in both developed and developing countries.

The medical research programs conducted in Burnet's AMREP laboratories encompass three areas: infectious diseases (hepatitis, HIV, influenza, malaria, tuberculosis), cancers (breast, ovarian, prostate, blood cancers), and autoimmune diseases (rheumatoid arthritis, lupus).

The institute undertakes innovative epidemiological research, including surveillance and modelling, complemented by participatory social research. Staff work at international and regional levels in more than 15 countries, to build capacity and strengthen health services with the aim of reducing the impact of major health problems.

Representing its key pillars of research and public health, the institute has four centres: Virology, Immunology, Population Health and International Health.

www.burnet.edu.au



Monash University School of Public Health and Preventive Medicine

Head: Professor John McNeil AM

The School of Public Health and Preventive Medicine is the second largest school within the Faculty of Medicine, Nursing and Health Sciences, and focuses on the prevention of disease and disability.

The school is built around strong methodological skills in epidemiology, biostatistics, data management, social science research and clinical medicine. More than 100 staff members have doctoral qualifications. The school's research program involves both clinical and public health research conducted in settings ranging from remote communities to workplaces to hospital wards both in Australia and internationally.

Skills in handling large clinical data sets are a key asset of the school, leading to extensive involvement in large-scale clinical trials, disease and procedure registries, drug and device surveillance, and longitudinal studies of occupational cohorts. Many of these studies have a high profile and require the highest levels of data integrity and quality control.

The school's 30 research units are grouped into six research divisions: Research Methodology, Prevention Science, Health Services Research, Occupational & Environmental Health Science, Clinical Epidemiology, and Critical Care Research. The Australasian Cochrane Centre has recently joined the school at AMREP.

www.monash.edu.au/sphpm



Research participant in a pilot study at Nucleus Network.

AT AMREP

Institutions, Schools and Major Centres located at AMREP



Monash University Central Clinical School

Head: Professor Napier Thomson AM

Central Clinical School departments based at AMREP are Medicine, Surgery, Immunology and Haematology (Australian Centre for Blood Diseases).

The Department of Immunology (Head: Professor Fabienne Mackay) is internationally renowned for its expertise in research, teaching and service delivery in immunology and immunopathology. Extensive research programs are in basic and translational immunology, and include highly successful collaborations with The Alfred and other AMREP partners. The department's research activities target diseases including allergy, asthma, autoimmunity, inflammation, diabetes, organ fibrosis, cancer and malaria. The department also focuses on engineering novel treatments for these diseases. Professor Mackay commenced as Head in 2009. She was previously Head of the Autoimmunity Research Unit at Sydney's Garvan Institute and has an outstanding track record in research into the molecular characterisation of inflammatory and autoimmune diseases.

The Department of Medicine (Head: Professor Napier Thomson) provides teaching and other academic programs for medical undergraduates and postgraduate research students. Research activities are undertaken by university staff employed in the department and also in hospital clinical departments integrated with the Department of Medicine, including Infectious Diseases, Neurosciences and Endocrinology.

The Department of Surgery (Head: Professor Jeffrey Rosenfeld) encompasses the hospitals of Alfred Health and Cabrini Health and contributes significantly to postgraduate research, training, audit and quality assurance processes. Surgical research programs are conducted in Cardiothoracic Surgery, Neurosurgery, Orthopaedics, Trauma, Burns, and Breast, Endocrine, Colorectal and Upper Gastrointestinal Surgery.

www.med.monash.edu.au/cecs



Australian Centre for Blood Diseases

Head: Professor Hatem Salem

The Australian Centre for Blood Diseases (ACBD) is a leading centre with recognised research, treatment, and educational programs for blood diseases. ACBD is affiliated with Monash University, Alfred Health, Eastern Health and Southern Health, and is organised into three integrated divisions:

- ◆ Clinical and Diagnostic Haematology/Oncology
- ◆ Clinical and Basic Research Programs
- ◆ Teaching and Education

ACBD's research programs are in Serpin Biology, Thrombosis, Vascular Biology, Fibrinolysis and Gene Regulation, and Malignant Haematology and Stem Cell Transplantation. The Eastern Clinical Research Unit, based at Box Hill Hospital, Maroondah Hospital and The Alfred, manages a large number of clinical trials in medical and surgical specialties.

www.acbd.monash.org



Nucleus Network

Chief Executive Officer: Dr Andrew Giddy

Medical Director: Professor Peter Hodsman

Nucleus Network is a not-for-profit clinical research and education company. It is Australia's leading clinical research organisation specialising in the conduct of early phase clinical trials. Wholly owned by Baker IDI Heart and Diabetes Institute, Nucleus Network comprises the AMREP Centre for Clinical Studies (a 30-bed early phase clinical trial unit), the Austin Centre for Clinical Studies (a 16-bed early phase clinical trial unit at the Austin Hospital), Clinical Trials Consulting and Nucleus Network Education.

Clinical trials performed at Nucleus Network involve either healthy volunteers or patients with specific medical conditions. The types of medicines tested at Nucleus Network are generally in the early stages of clinical development (Phase 1).

www.nucleusnetwork.com.au



Institutions, Schools and Major Centres located at AMREP

Simulated clinical education at the Australian Centre for Health Innovation.



www.ntri.org.au

National Trauma Research Institute

Director: Professor Russell Gruen

Launched in October 2003, the National Trauma Research Institute (NTRI) has successfully brought together expert researchers from multiple disciplines to enable high quality practice and policy-changing research into the care of injured people. The institute's research areas range through pre-clinical animal based research, pre-hospital emergency presentation, intensive care management, definitive surgical care and rehabilitation medicine.

NTRI is seamlessly integrated with The Alfred Trauma Service, the largest and busiest trauma service in Australasia. NTRI has world-class laboratories, clinician-researcher leaders, and strong local, statewide, interstate and overseas partnerships.



www.maprc.org.au

Monash Alfred Psychiatry Research Centre

Director: Professor Jayashri Kulkarni

Over 100 staff and postgraduate students at the Monash Alfred Psychiatry Research Centre (MAPrc) work to discover new treatments, knowledge and services for people with mental illnesses. Senior research staff include psychiatrists, clinical psychologists, neuropsychologists, neuroscientists and clinical researchers.

MAPrc's research programs address mental health issues using a wide variety of approaches. Cutting-edge neuroimaging techniques provide breakthrough insights into brain structure and function in health and illness. Innovative uses of adjunctive treatments boost the effectiveness of conventional medications for major mental illnesses. Teams address ways of increasing the efficiency of community mental health service delivery and the mental health aspects of problem gambling. This bench-to-bedside research translates directly into everyday benefits for people with mental illnesses, carers and healthcare professionals.



www.healthinnovation.com.au

Australian Centre for Health Innovation

General Manager: Cathie Steele

Director of Research: Professor Peter Cameron

Established in 2005, the Australian Centre for Health Innovation (CHI) provides health technology evaluation, innovation and simulation education services to enhance patient safety and quality of care. Its fully quarantined, hospital grade test bed network is the ideal environment to trial, test and demonstrate new clinical and administrative health technologies and processes. A joint venture of The Alfred, La Trobe University, Monash University and Baker IDI, CHI is the only facility of its kind in Australia. Over 7,000 clinicians, managers and technology developers from across Australia used CHI services in 2009.



AlfredHealth

www.latrobe.edu.au/nursing

La Trobe/Alfred Clinical School of Nursing

Head: Associate Professor Bill McGuinness

A collaborative endeavour between La Trobe University and The Alfred, the Clinical School assists nurses to undertake a range of clinical projects, including the completion of higher degrees, and promotes interdisciplinary and inter-institutional collaboration in healthcare delivery.

AlfredHealth



www.deakin.edu.au/hmnbs/nursing

Alfred/Deakin Nursing Research Centre

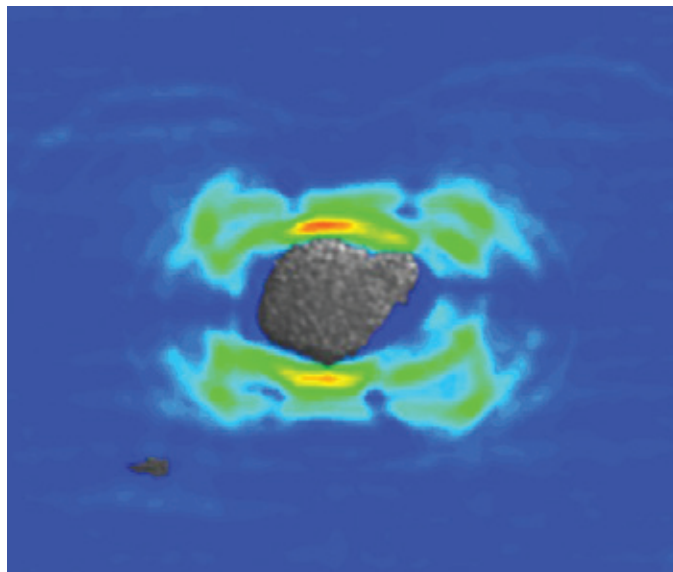
Head: Professor Mari Botti

The Alfred/Deakin Nursing Research Centre leads research to improve health outcomes across acute healthcare settings through multidisciplinary research activities that focus on improving quality and safety in the delivery of evidence-based clinical care. PhD research programs are conducted in oncology, cardiac surgery and aged care nursing.

Disturbed blood flow promotes clotting

First recognised more than 150 years ago, disturbed blood flow is a key factor provoking disease-causing blood clots but the underlying mechanism has not been identified. Researchers from the Australian Centre for Blood Diseases have uncovered the molecular basis by which mechanical forces promote clotting (published in *Nature Medicine*). Furthermore, these studies have revealed that this new clotting mechanism is resistant to the effects of commonly used anti-clotting drugs, such as aspirin, clopidogrel or warfarin, identifying a potentially important mechanism of antithrombotic drug failure. It is therefore possible that therapeutic targeting of platelet biomechanical processes may represent an effective approach to reduce the prothrombotic effects of disturbed blood rheology and enhance the overall effectiveness of commonly used antithrombotic drugs.

Nesbitt WS, Westein E, Tovar-Lopez FJ, Tolouei E, Mitchell A, Fu J, Carberry J, Fouras A, Jackson SP. A shear gradient-dependent platelet aggregation mechanism drives thrombus formation. Nat Med 2009;15(6):665-73.



Colour map showing the impact of a platelet thrombus on local haemodynamic blood flow. Human blood seeded with fluorescent tracer particles was perfused over the thrombus (flow from left to right). High speed fluorescent imaging revealed the development of distinct mechanical shear zones surrounding the thrombus defined by up- and downstream low shear pockets (blue regions) and high shear regions at the sides of the thrombus (yellow-red regions).

Breakthrough in high blood pressure treatment

A world-first breakthrough in the treatment of high blood pressure was pioneered by Monash University and Baker IDI researchers, with a study showing a new catheter-based treatment is delivering remarkable improvements in blood pressure levels in clinical trial participants. It is estimated that 30-40 per cent of the population suffers from hypertension, and of that group, 15 per cent are resistant to standard therapies. The new procedure involves insertion of a catheter through the femoral artery and uses radio frequency treatment to 'silence' sympathetic nerves in the renal artery. The results of this study, which were published in *The Lancet*, are expected to revolutionise treatment for high blood pressure.

Krum H, Schlaich M, Whitbourn R, Sobotka PA, Sadowski J, Bartus K, Kapelak B, Walton A, Sievert H, Thambar S, Abraham WT, Esler M. Catheter-based renal sympathetic denervation for resistant hypertension: a multicentre safety and proof-of-principle cohort study. Lancet 2009;373(9671):1275-81.

New treatment for schizophrenia

A drug (raloxifene) that is commonly used to treat osteoporosis is offering new hope for people with schizophrenia following promising results from a world-first clinical trial published in *Psychoneuroendocrinology*. A team of researchers at the Monash Alfred Psychiatry Research Centre (MAPrc) is leading the way with the new treatment that reduces the symptoms of schizophrenia without the adverse side-effects of standard estrogen treatments. Raloxifene has estrogen-like effects in the brain and had a similar positive effect on schizophrenia symptoms in post-menopausal women as standard estrogen. The research team is applying the findings to also develop treatment options for younger women and men.

Kulkarni J, Gurvich C, Lee SJ, Gilbert H, Gavrilidis E, de Castella A, Berk M, Dodd S, Fitzgerald PB, Davis SR. Piloting the effective therapeutic dose of adjunctive selective estrogen receptor modulator treatment in postmenopausal women with schizophrenia. Psychoneuroendocrinology 2010; 35(8):1142-1147.



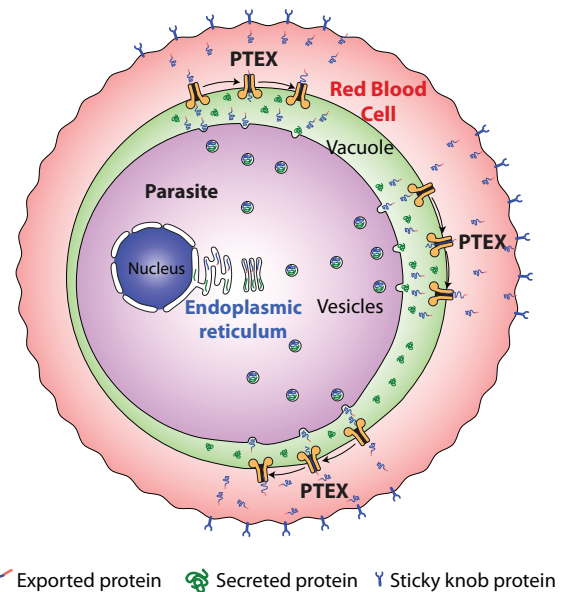
Professor Jayashri Kulkarni's research team studies novel treatments for schizophrenia.

An Achilles heel in malaria offers new therapy hope

Scientists from the Burnet Institute, in collaboration with the Walter and Eliza Hall Institute and Deakin University Medical School, have discovered a protein pore (PTEX) that may lead to the development of new treatment options for malaria (published in *Nature*). There are more than 400 million cases of malaria each year and more than one million people, mainly children, die from the disease. New therapies are urgently needed to combat ever-increasing resistance to available drugs.

Malaria is spread via mosquitoes and its most lethal form is caused by the parasite *Plasmodium falciparum*. The parasite grows in a compartment (vacuole) inside the red blood cell, and to survive and cause illness it transports hundreds of proteins into the interior of the red blood cell. While these proteins have many different functions crucial to parasite growth and survival, a common feature is that they must all pass through the same PTEX pore in the surrounding membrane. The main significance of the discovery of the identity of the PTEX pore is its implication for a new anti-malarial therapy. The next step is to identify drugs that block this protein channel. Potential therapies could interfere with many different crucial processes in the one hit. In that sense, the PTEX pore is an Achilles heel of the malaria parasite.

de Koning-Ward TF, Gilson PR, Boddey JA, Rug M, Smith BJ, Papenfuss AT, Sanders PR, Lundie RJ, Maier AG, Cowman AF, Crabb BS. A newly discovered protein export machine in malaria parasites. *Nature* 2009;459(7249):945-9.



Malaria parasites extensively modify the human red blood cells (RBC) they infect by exporting hundreds of proteins into the RBCs. The PTEX pore is the channel through which some of these proteins are transported into the interior of the RBC from the vacuole in which the parasite grows.

Routine test is not the answer

A heart failure test commonly used in emergency departments overseas has been found to be wasteful by a study at The Alfred and Northern hospitals. Published in the international journal, *Annals of Internal Medicine*, the study found that routine use of the expensive B-type natriuretic peptide (BNP) test in all patients with shortness of breath did not improve patient management.

The BNP test is used widely in the US as an important indicator for heart failure patients, and it is becoming more popular in Australia. More than six million patients present to emergency departments across Australia each year and, of these, about 10 per cent have shortness of breath. If all of these patients were given a BNP test it would cost Australian hospitals more than \$30 million a year. The study found that measurement of BNP in all emergency patients had no effect on clinical outcomes and routine use of the test is not supported.

Schneider HG, Lam L, Lokuge A, Krum H, Naughton MT, De Villiers Smit P, Bystrycki A, Eccleston D, Federman J, Flannery G, Cameron P. B-type natriuretic peptide testing, clinical outcomes, and health services use in emergency department patients with dyspnea: a randomized trial. *Ann Intern Med* 2009;150(6):365-71.

Heart of Soweto: a landmark study of heart disease in South Africa

A landmark research program is being conducted by Baker IDI in collaboration with the University of the Witwatersrand, South Africa. The team is documenting emergent heart disease in Africa's largest urban concentration of black Africans. Comprehensive data from more than 6,000 hospital and 1,000 primary care cases (2006-2009), resulted in unique reports on emergent heart disease, heart failure, hypertension (*International Journal of Cardiology*) and rheumatic heart disease; the latter highlighting the need to re-instate rheumatic heart disease as a reportable condition in adults. With a new phase of interventional research planned, Heart of Soweto is informing national health policy in South Africa and has resulted in the Heart of Africa collaboration involving many other African nations.

Tibazarwa K, Ntyintyane L, Sliwa K, Gerntholtz T, Carrington M, Wilkinson D, Stewart S. A time bomb of cardiovascular risk factors in South Africa: results from the Heart of Soweto Study "Heart Awareness Days". *Int J Cardiol* 2009;132(2):233-9.



South African nurse Puthuma measures a patient as part of the Heart of Soweto study.

RESEARCH FACILITIES

The Healthy Lifestyle Research Centre at Baker IDI

In a bid to combat the epidemic of diabetes and its most serious complication, heart disease, Baker IDI, with support from the Commonwealth Government, has established the Healthy Lifestyle Research Centre to examine how genetic and environmental factors interact to regulate body weight and body composition in humans as a basis for development of lifestyle interventions.

The Healthy Lifestyle Research Centre's research program will provide the foundation for the ongoing development and refinement of evidence-based, sustainable, physical activity and nutrition intervention strategies for people in the wider community living with or at risk of the complications of obesity, particularly its metabolic and cardiovascular consequences. This will include development and testing of novel intervention delivery strategies via families, communities and the workplace for dissemination nationally.

Research will take a 'whole of day approach' to understand and improve an individual's health. This information will be used to individualise nutrition and physical activity interventions for maintaining health or regaining health for patients with obesity-related disease.

Physical Activity Research

There is substantial evidence that physical activity contributes to the primary and secondary prevention of several chronic diseases and is associated with a reduced risk of premature death. Regular physical activity plays an important role in preventing obesity via its substantial influence on energy expenditure.

Improving physical activity, particularly in older adults who are inactive, may have significant health benefits. Indeed programs developed at Baker IDI such as the Lift for Life strength training program have demonstrated the benefits of exercise programs as both a preventive measure and as an alternative to common drug therapies.

The state-of-the-art research gymnasium is specifically designed to accommodate overweight and obese individuals, and will serve as the basis for development of further prevention and intervention programs for individuals who are healthy, at risk of disease, or who have a metabolic disease.

Nutrition Research

Diet and nutrition are important factors in the promotion and maintenance of good health throughout life. Their role as determinants of chronic non-communicable diseases is well established and consequently they occupy a prominent position in prevention activities.

The burden of chronic diseases is rapidly increasing worldwide and almost half of the total chronic disease deaths are attributable to cardiovascular diseases. Obesity and diabetes are also showing worrying trends, not only because they already affect a large proportion of the population, but also because they have started to appear in younger age groups.

Lifestyle modification is the cornerstone of treating and preventing diseases of obesity. The nutrition program will examine and endeavour to optimise diets for people with obesity, cardiovascular disease, insulin resistance and Type 2 diabetes.

Clinical Physiology Research

The roles of both energy intake and expenditure in determining body fat gain throughout life will be examined in human physiological studies. Hormonal and cellular investigations will also be conducted to identify the underlying metabolic causes of individual differences in body composition and energy regulation. Using the research platforms of epidemiology, physiology, cell biology and behavioural research, impacts of physical activity and nutrition will be investigated to address knowledge gaps and contribute to the translation of this research into new drugs, devices and treatment options for patients, and to translation of the research into public health policy and practices.

The Healthy Lifestyle Research Centre will cater for a variety of human physiological studies including calorimetric measurements of energy expenditure, aerobic and strength capacity, body composition analyses, muscle and fat biopsies, glucose clamps and metabolic tracer assessments, blood, tissue and urine specimen processing.

Access

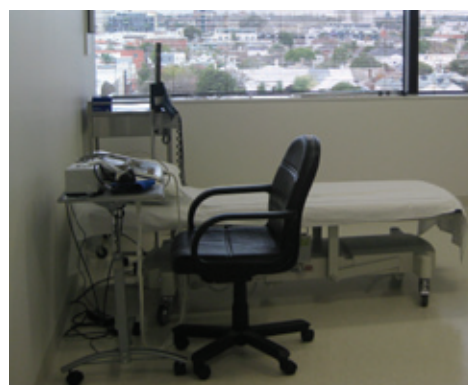
Enquiries about accessing any facilities at the Healthy Lifestyle Research Centre should be directed to Professor Bronwyn Kingwell (email: bronwyn.kingwell@bakeridi.edu.au).



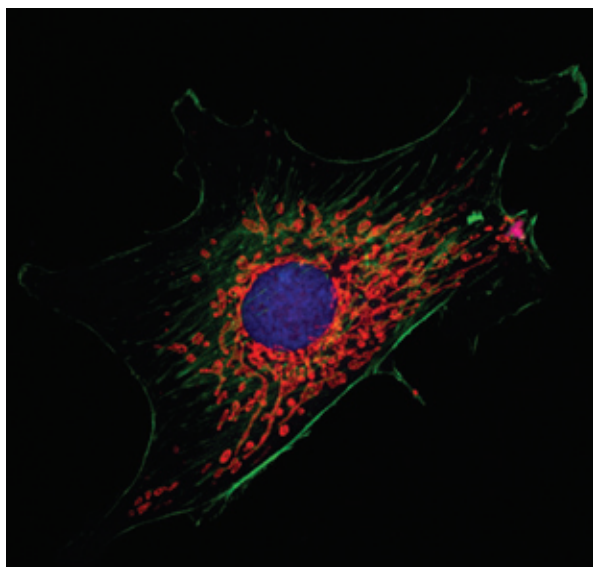
Physical activity intervention research will be conducted in the research gymnasium.



Nutritional interventions will be conducted in the research kitchen and neighbouring research dining room.



Clinical research rooms will support human physiology studies, including physical activity, nutrition and metabolic studies.



Bovine pulmonary artery endothelial cell imaged in the MMI@AMREP facility.

Monash Micro Imaging at AMREP (MMI@AMREP)

Monash Micro Imaging established a node at AMREP to manage the core imaging resources of Baker IDI, the Burnet Institute and Monash University Central Clinical School. Stephen Cody has joined MMI to manage and develop the MMI@AMREP facility. Stephen coordinates and facilitates microscopy developments, and is responsible for microscopy training and research support. Training seminars and workshops are also conducted to help broaden understanding of imaging.

Currently MMI@AMREP manages three confocal and several conventional fluorescence microscopes within PC2 laboratories. There is also a dedicated deconvolution microscope within a PC3 facility if required. MMI@AMREP staff are available to assist with experimental design, and techniques such as live and fixed cell imaging, time-lapse, 3D, high resolution of large areas, fluorescence, brightfield, phase, DIC, and ion imaging such as Ca^{2+} and pH.

MMI@AMREP has an office in Baker IDI (lower ground floor) and a Monash office on the sixth floor of Burnet Tower. For further information, contact Stephen Cody (email: stephen.cody@med.monash.edu.au).

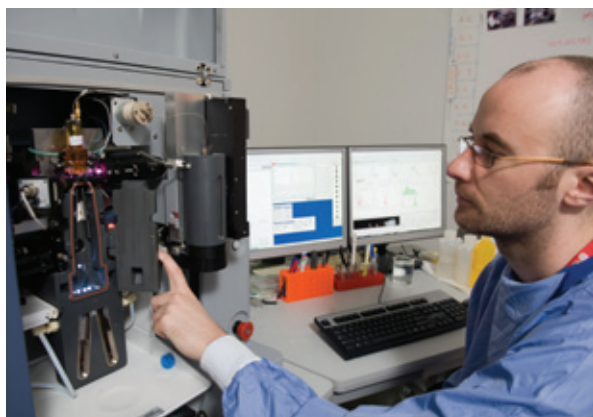


Mark Ziemann sets up the Illumina Genome Analyzer capable of high throughput parallel sequencing, ChIP-Seq and RNA-Seq technologies.

Omics (DNA and Blood Profiling) Facility

The DNA and Blood Profiling Facility at Baker IDI integrates the Genomics, Epigenomics, Metabolomics and Bioinformatics groups. This systems biology approach enables a more rapid and precise look at biological questions from multiple starting sources (i.e. DNA, RNA, plasma, protein). The facility contains state-of-the-art instruments, including the Illumina Genome Analyzer II (next generation sequencing) and iSCAN System (gene expression microarray), the Sequenom MassArray for genotyping as well as a number of specialised mass spectrometers for lipids profiling, peptide mass fingerprinting, biomolecule separation and protein profiling.

For more information on the instruments and the services offered, contact Dr Farhad Shafiei (email: farhad.shafiei@bakeridi.edu.au), or visit www.bakeridi.edu.au/core_facilities/OMICS/



Michael Thomson sets up the FACSria for a cell sort.

Flow Cytometry Facility

The AMREP Flow Cytometry Facility is a state-of-the-art, world class cell sorting and cell analysis laboratory, catering for the scientific research community based at AMREP and broader Melbourne. The facility is located in the Monash Department of Immunology, AMREP, and some of the instruments are located within Baker IDI and the Burnet Institutes.

The Flow Cytometry Facility offers comprehensive training and education, experimental design and protocol guidance specifically targeting effective data generation and interpretation. Services catering for both animal and human cell sorting in a PC2 environment are offered. The facility can also handle infectious sample sorting (e.g. HIV, hepatitis C) in a dedicated PC3 environment, which is unique to Melbourne.

For more information on the platforms available and the services offered, contact the manager of the facility, Geza Paukovics (email: paukovic@burnet.edu.au).

RESEARCH FACILITIES

Mouse Metabolic Phenotyping Facility

Devising new therapies to combat obesity is challenging due to the complex nature of metabolic disease, which involves the interaction between genetics and the environment. Mice provide an essential model for studying metabolic disorders since the whole mouse genome has been sequenced and candidate genes for coronary disease, cardiomyopathy, diabetes, obesity and other disorders of metabolism have been identified. Transgenic technology and gene targeting protocols have allowed researchers to create new mouse lines with specific phenotypes and well-defined DNA structural changes that enable diseases of metabolism to be better understood.



The Mouse Metabolic Phenotyping Facility at Baker IDI Heart and Diabetes Institute was established to provide services to scientists using mice to study obesity, diabetes, cardiovascular disease and other metabolic diseases. Using state-of-the-art tools and methods, the facility provides sophisticated, standardised, high quality metabolic and physiologic phenotyping services for rodent models of obesity, diabetes and related disorders. This service will enable scientists to identify and study new mouse models of complex metabolic diseases. By manipulating candidate genes in mice, scientists will gain a much better understanding of the genetic origins of obesity and related diseases, and the effects of different environmental factors.

Professor Mark Febbraio (email: mark.feibraio@bakeridi.edu.au) or Dr Clinton Bruce (email: clinton.bruce@bakeridi.edu.au) may be contacted for information on services.

Burnet ImmunoMonitoring Facility

The Burnet ImmunoMonitoring Facility (IMF) was officially launched on 3 June 2010 by Peter Williams, National Association of Testing Authorities (NATA) State Manager for Victoria and Tasmania. He presented the certificate of NATA Research and Development (R&D) accreditation to the Director of the Burnet IMF, Associate Professor Rosemary Ffrench. The Burnet IMF is the first Victorian facility to receive NATA R&D accreditation. The facility develops optimised and validated immunological assays for clinical trials and pre-clinical research compliant to ISO/AS17025.

The development of vaccines and immunotherapies requires the sophisticated assessment of immune responses in both animals and in human clinical trials. Cell-mediated immunity is a key biomarker for most vaccines and immunotherapies and involves the activity of specialised cells including macrophages, dendritic cells, natural killer cells, antigen-specific cytotoxic T-lymphocytes, helper T-lymphocytes and the release of various cytokines in response to antigen stimulation.

The Burnet IMF aims to support both internal and external research in vaccine development by conducting and validating relevant immunological assays to Good Laboratory Practice standards. Increasingly, regulatory authorities request that assays showing markers of vaccine efficacy are robust and standardised. These assays are often difficult to complete and require a high level of operator skill and specialised equipment.

Analysis of biological samples is performed using the following appropriately validated analytical techniques and processes:

- ◆ Isolation and cryopreservation of mononuclear cells, plasma and serum
- ◆ ELISpot assays
- ◆ Multiplex bead array systems
- ◆ ELISA
- ◆ Neutralisation activity assays
- ◆ Phagocytic function and oxidative burst activity analysis

Enquiries about the Burnet IMF should be directed to Associate Professor Rose Ffrench, Facility Director (email: ffrench@burnet.edu.au) or Kylie Goy, Facility Coordinator (email: kgoy@burnet.edu.au).



From left: Peter Williams presents Associate Professor Rose Ffrench and Professor Brendan Crabb with the NATA certificate of R&D accreditation.



Burnet ImmunoMonitoring Facility.

IAN POTTER LIBRARY



The Ian Potter Library provides a single integrated library and information service to staff and students of AMREP. Acting as the hub of the Alfred Health Library Service, the Ian Potter Library also supports the local library services at Caulfield Hospital and Sandringham Hospital.

Supporting Research

The library organises its information resources to support patient care, educational training and research activities of the AMREP institutions. Supporting research is a major focus for the library, and keeping abreast of new research programs and developments is important. With representatives of all the AMREP institutions, the Library Advisory Committee advises on information services and resources required by research scientists and students. Key resources include access to full-text electronic journals, bibliographical databases in biomedicine, technical monographs, specialist reference texts and overseas document requests. The library also provides frequent training classes for the use of electronic resources in its computer training room.

Improving Access to Online Resources: e-books

Although the usage and demand for e-journals continues to be the stand-out feature of the library service, e-books are slowly growing in importance for library users. The recorded online usage of e-books for 2009 was 5,200. This compares with about 20,000 loans for print books in 2009. E-books are purchased by the library either on a subscription basis or as a one-time purchase, and can be accessed easily via the library's online e-book list.

International Collaboration

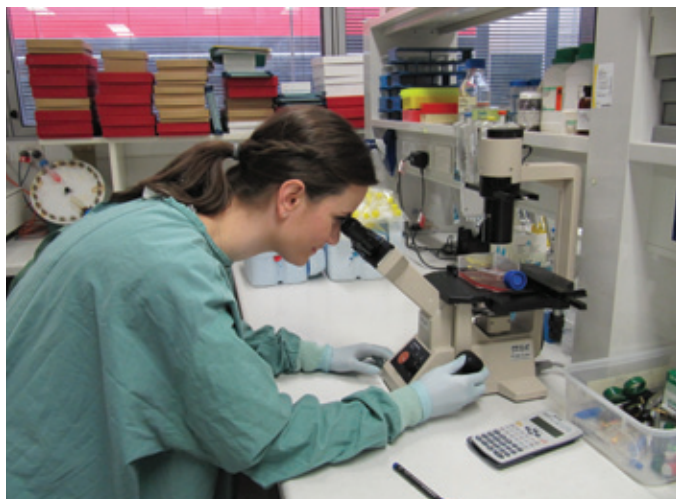
Li Hongmei is Head of the Information & Teaching Department of the Kunming Medical University Library in Yunnan Province, China. She was invited to join the Alfred Health Library Service between January and July 2009 as a visiting scholar. Li Hongmei's visit was supported by a scholarship provided by the China Scholarship Council. Kunming Medical University has 14,000 students, most of which are doctors in training. During her stay, Li Hongmei researched medical library practice in Australia and gained ideas regarding library user training and education.

Green Initiatives

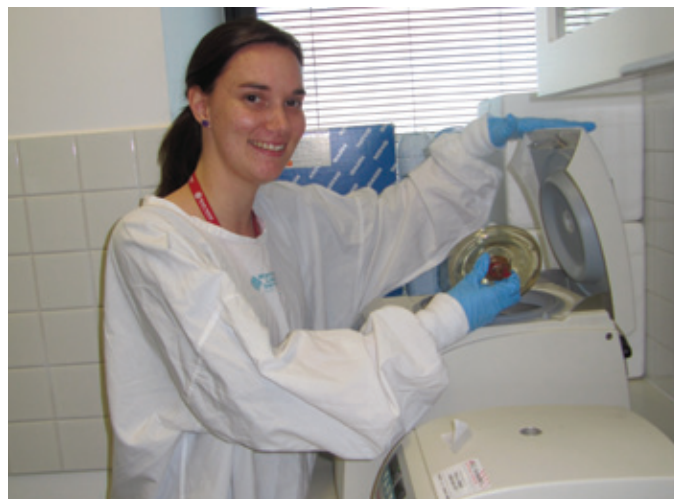
What is photocopying when you take away the paper and toner? Answer: rapid scanning. In 2009, the Ian Potter Library introduced a new service by hooking up a Ricoh photocopier and a PC station to provide rapid scanning. This service is proving to be popular with library users, who often only need to read a chapter or small section from a large textbook. The scans are converted automatically to portable document format (PDF), are high-resolution, and include colour images. The PC station allows the PDF to be viewed and then saved onto a USB memory stick. This new service is simple, fast, reduces the consumption of paper and toner, and is provided free to library users.

AMREP HONOURS SCHOLARSHIPS

The AMREP Honours Scholarships scheme was devised to attract outstanding Science and Biomedical Science students to undertake their Honours year at AMREP. The scholarship recipients for 2010 were Lauren Giuffrida (Autoimmune Diseases Laboratory, Monash Department of Immunology) and Elisha Horat (Intracellular Signalling and Gene Expression Laboratory, Burnet Institute).



Lauren Giuffrida.

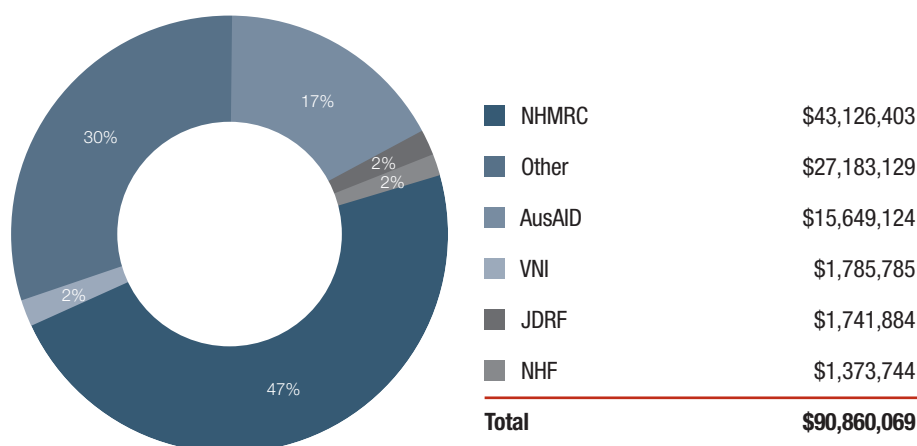


Elisha Horat.

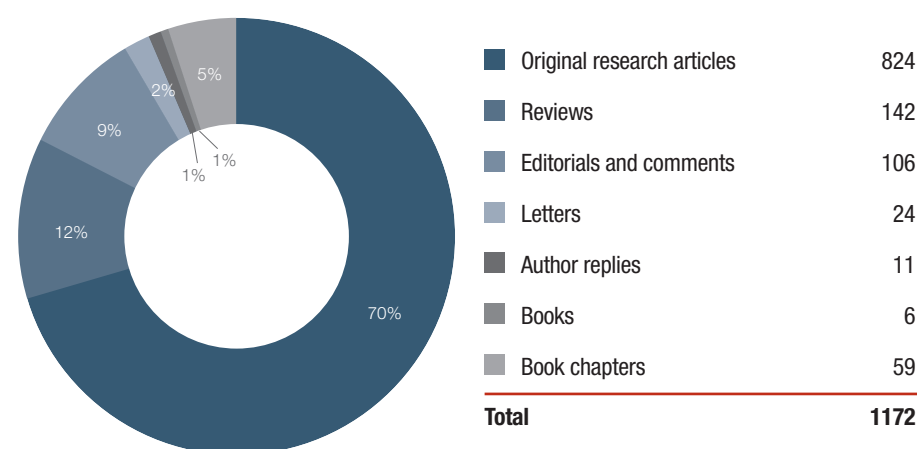
RESEARCH OUTPUT

2009 AT A GLANCE

External funding



Publications



In 2009 AMREP researchers published original research articles in top-ranking international journals including

New England Journal of Medicine [IF: 47.050]

The Lancet [IF: 30.758]

Journal of the American Medical Association [IF: 28.899]

Nature Medicine [IF: 27.136]

The average impact factor of all journal articles published in 2009 was 4.127.

22.7% of all articles were published in journals with an impact factor of ≥ 5 .

Note: 2009 impact factors.

For a complete list of publications by AMREP staff in 2009, see the 2009 AMREP Research Report (www.alfredhealth.org.au/publications).

Higher degree completions

37 PhD completions

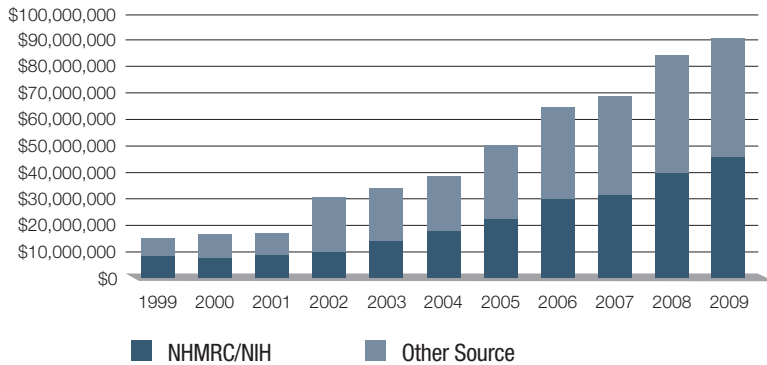
6 Other doctoral completions

101 Masters completions

In 2009, there were 291 current PhD and 22 other doctoral students at AMREP.

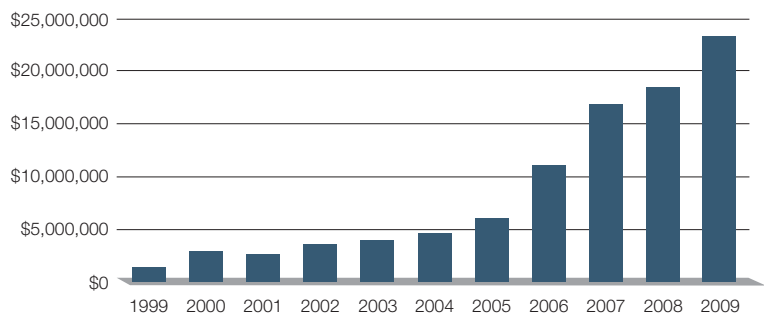
For details of all current doctoral students in 2009, see the 2009 AMREP Research Report (www.alfredhealth.org.au/publications).

External research funding received 1999-2009

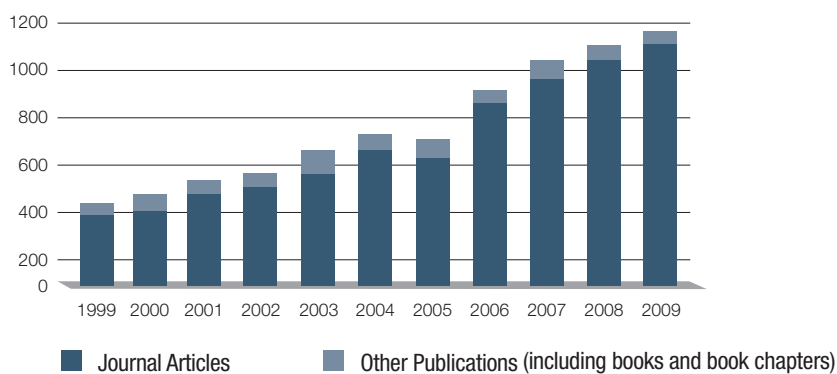


External research funding includes funds received from peer reviewed funding schemes (eg. NHMRC, National Heart Foundation, NIH), other government grants (eg. Department of Human Services), industry and university grants (eg. Monash University funding schemes).

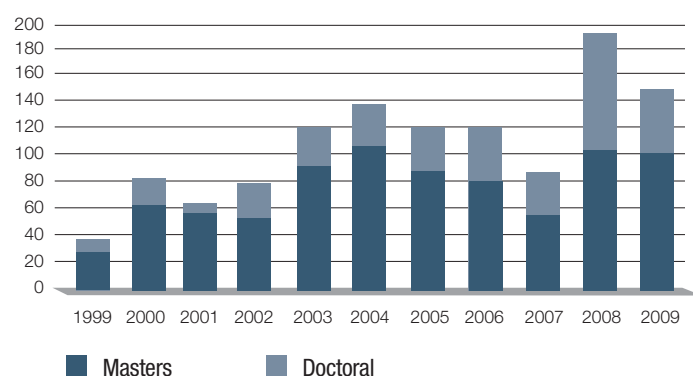
Commercially sponsored clinical trial income 1999-2009



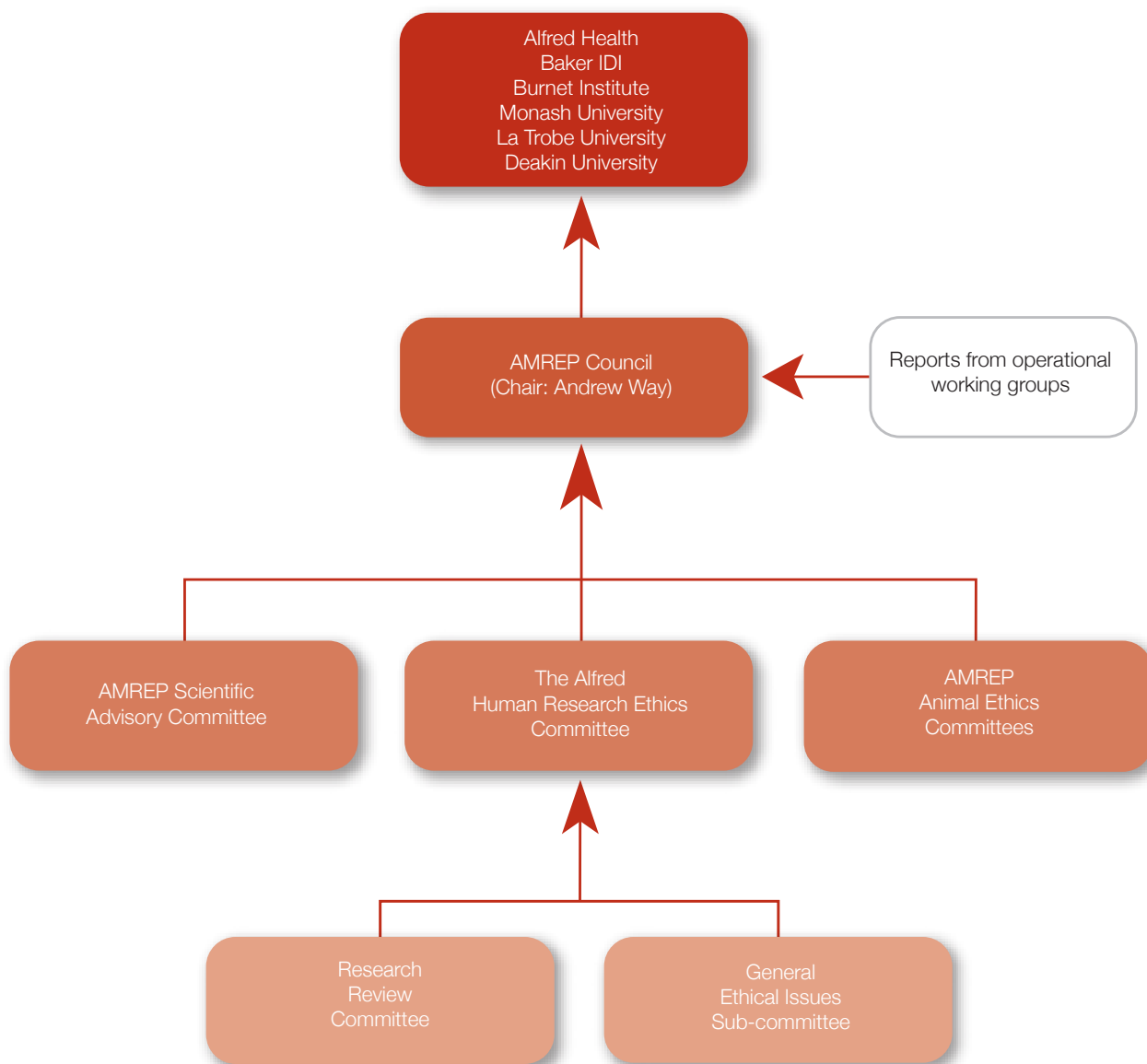
Publications 1999-2009



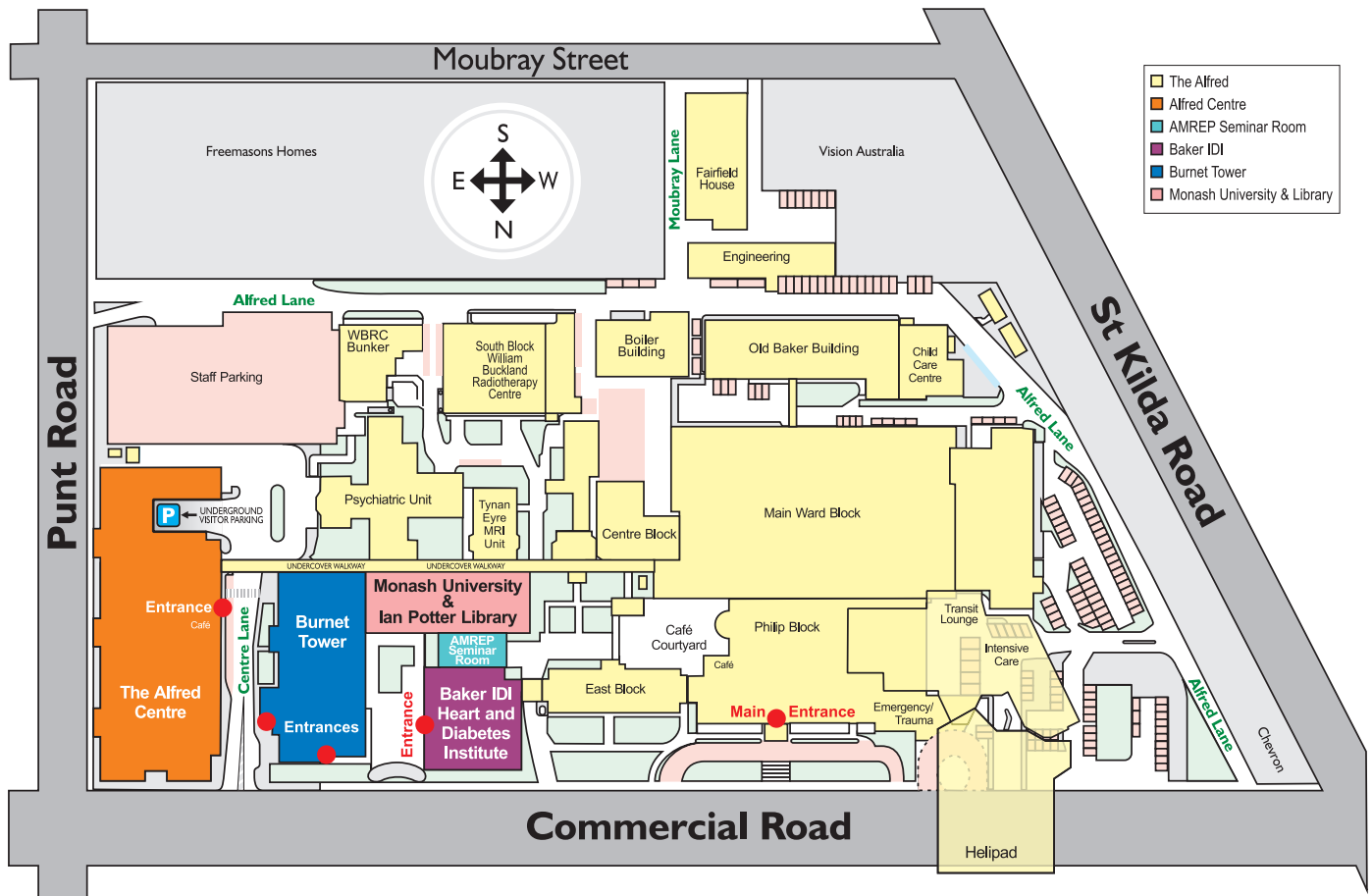
Higher degrees completed and passed 1999-2009



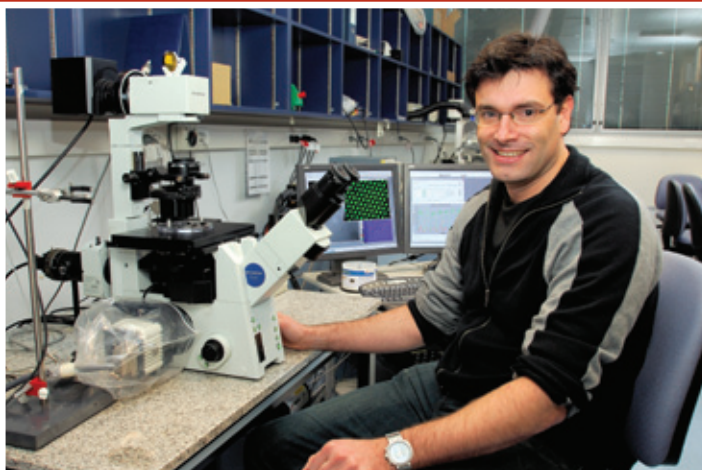
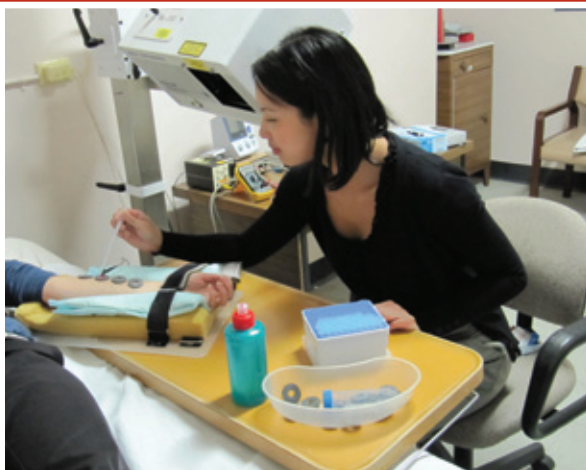
AMREP REPORTING STRUCTURE



AMREP LOCATION AND SITE PLAN



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