



MONASH University
Medicine, Nursing and Health Sciences

A close-up photograph of a laboratory rack filled with test tubes. A blue pipette is positioned above the tubes, with a drop of blue liquid about to fall. The scene is brightly lit, creating a clean and scientific atmosphere.

**Faculty
Prospectus
2009**

MNHS Prospectus

Editorial Committee

Andrew Evans

Ian Smith

Clint Rodgers

Editor

Alexandra Roginski

Writer

Maureen Kutner

Design, Photography and Production

Technology Services Group – Multimedia Services

Editorial Support

Helen Pattinson

Marketing and Communications Contacts

Telephone: + 61 3 9905 9329

Email: communications.mnhs@med.monash.edu.au

Central Faculty Contacts

Telephone: +61 3 9905 4301

Email: enquiries@med.monash.edu.au

Web: www.med.monash.edu.au

Mail

Faculty of Medicine, Nursing and Health Sciences

Building 64

Monash University

Clayton, Victoria 3800

Australia

Contents

From the Dean	1
Introduction to the Faculty	2
Medicine, Nursing and Health Sciences: at a glance	4
Our vision and values	6
A multi-campus faculty	8
MBio: Australia's new nucleus for biomedical science	14
Schools of the Faculty	16
Our Research...Your Future	38
Key Research Areas	40
Monash Institutes of Health	41
Monash Institute of Medical Research	43
Australian Regenerative Medicine Institute (ARMI)	44
Stem Cell Science	46
Early Human Development	50
Cardiovascular Disease	52
Public Health and Epidemiology	56
Global Health	58
Health Science	60
Infectious Diseases	62
Inflammation, Allergy and Autoimmunity	64
Mental Health and Cognitive Neurosciences	66
Cancer	68
Obesity and Metabolic Neurosciences	70
Indigenous Health	72
Rural Health	74
Structural Biology and Drug Development	76
Women's Health	78
Men's Health	80
Technology Platforms	82
Number one for teaching and learning	84
Undergraduate courses	88
Postgraduate courses	90
Going global	92
Our teaching	94
Our programs in equity	96
Our alumni	98
Real outcomes: commercialisation and industry engagement	108



From the Dean



The Faculty of Medicine, Nursing and Health Sciences at Monash University is unique among its Australian counterparts, with undergraduate and postgraduate curricula spread over metropolitan, rural and international sites, including Australian Medical Council accredited undergraduate degrees in Melbourne and Malaysia, and a postgraduate medical degree at our Gippsland Medical School.

We continue to grow in the field of biosciences research. A significant number of the departments in the School of Biomedical Sciences have been ranked number one in the country, and the Faculty has an outstanding record in the area of competitive government grant funding. In terms of teaching and learning performance across the health disciplines, our Faculty is ranked number one by the Australian Government and has received the highest amount of performance-based funding.

On the Clayton campus we are developing Australia's leading bioscience campus – MBio – fostering national and international leadership in biomedical science, and pursuing the ongoing recruitment of luminary research leaders and the development of research platforms and infrastructure developments to maintain and further enhance our reputation.

Our research clusters on the precincts of Monash Medical Centre and The Alfred Hospital lead their respective areas of research in Australia and provide the Faculty with enormous opportunities. Our affiliations with independent medical research institutes at these precincts, such as the Baker IDI Heart and Diabetes Institute, Burnet Institute and Prince Henry's Institute, strengthen our research.

We are moving towards a seamless integration of our biomedical and public health research expertise with the clinical excellence of our research clusters. This model ensures our international competitiveness and will have a real impact on health outcomes and workforce development. Our growing strength in public health and clinical sciences is critical to this process, and the new School of Public Health and Preventive Medicine best exemplifies this.

Outstanding young students continue to be attracted to our evolving campus at Peninsula. We expect to rapidly gain recognition as national leaders in nursing and allied health education as our nursing, physiotherapy and occupational therapy departments continue to grow and expand their curricula.

The Faculty provides learning opportunities that encourage the intellectual, social and ethical development of graduates. We not only prepare students to enter their respective health-related professions, but train future leaders for Australia and the region, inculcating values of equity, diversity and egalitarianism. These values are fundamental to the identity of the Faculty and the University.

I am optimistic and enthusiastic about the possibilities and challenges in the years ahead, and look forward to the Faculty of Medicine, Nursing and Health Sciences solidifying its position as a national and international leader in the fields of health and medical research and education.

Professor Steve Wesselingh
Dean
Faculty of Medicine, Nursing and Health Sciences

Introduction to the Faculty

Since the commencement of its first medical class in 1961, the Faculty of Medicine, Nursing and Health Sciences has grown to become a complex and geographically diverse organisation with an international reputation for excellence in teaching and research. Monash today offers the broadest suite of programs across health and medical disciplines of any Australian university, training students in fields as diverse as radiography, biomedical science, social work and midwifery. The Faculty supports over 1,700 academic and general staff (not including casual and sessional staff), along with some 1,500 honorary staff, and a total of approximately 6,500 postgraduate and undergraduate students.

Spread over five Monash University campuses, the Faculty comprises ten schools (each containing multiple departments) together with 29 teaching and clinical centres, and two research institutes – the Monash Institute of Medical Research (MIMR) and the Australian Regenerative Medicine Institute (ARMI).

In addition to our own research institutes, the Faculty is affiliated with internationally-acclaimed research institutes including the Baker IDI Heart and Diabetes Institute, Burnet Institute, Prince Henry's Institute, and the Mental Health Research Institute. We also participate in five co-operative research centres (CRCs) addressing asthma, dairy products, inflammatory diseases and vaccine technology.

The Faculty's research reputation is founded on ground-breaking contributions to medical science. Our Foundation Professor of the Department of Obstetrics and Gynaecology, Dr Carl Wood, delivered Australia's first IVF baby in 1980. Another member of that team, leading stem cell scientist Professor Alan Trounson, in 2007 took leadership of the \$3 billion budget of the California Institute of Regenerative Medicine. Our research teams work tirelessly to continue to make inroads into our understanding of devastating illnesses such as malaria and cancer.



Below: Dr Belinda Henry, a researcher in the Department of Physiology.



Clinically, we link with four metropolitan healthcare services: Bayside, Eastern, Southern and Peninsula, and with Ambulance Victoria.

Our reach extends beyond the Melbourne metropolitan boundary, with the School of Rural Health nurturing four regional clinical schools at Gippsland, East Gippsland, Bendigo and Mildura. Each site is the focal point of a distributed regional network that links hospitals, rural health services and other rural community settings.

The quality of the Faculty's teaching and learning performance is evident from Monash receiving the highest ranking – and subsequently the highest funding – from the Learning and Teaching Performance Fund of the Department of Education, Employment and Workplace Relations.

Internationally, the Faculty is unique among Australian universities in its ability to deliver teaching and conduct research at its own campuses on three continents.

Beyond our operations in Australia, Malaysia and South Africa, we are also engaged in the offshore delivery of undergraduate and postgraduate programs, as well as hosting students and researchers from many nations. This international aspect of the Faculty reflects the University's vision of Monash as a global institution.

It's a fascinating journey that spans almost five decades.



Medicine, Nursing and Health Sciences: at a glance

Established 1961

Campuses

- Clayton
- Caulfield
- Peninsula
- Gippsland
- Malaysia
- South Africa

Schools

- Biomedical Sciences
- Central Clinical School
- Eastern Health Clinical School
- Medical Schools (Gippsland, Malaysia, Central)
- Nursing and Midwifery
- Psychology, Psychiatry and Psychological Medicine
- Primary Health Care
- Public Health and Preventive Medicine
- Rural Health
- Southern Clinical School

Adjunct Professor John Murtagh, one of the Faculty's most eminent alumni, commenced his medical studies in the first cohort in 1961. Murtagh's *General Practice* is the most widely-used text in the primary healthcare field.

Top: John Murtagh, front and centre as part of the first graduating class in 1966.

Bottom: Professor Murtagh with the Dean of the Faculty of Medicine, Nursing and Health Sciences, Professor Steve Wesselingh, in November 2008, receiving a plaque to honour his 30th year organising the Annual Update Course for General Practitioners.

Faculty operating budget

Provisional budget for 2009:

- \$400 million (plus philanthropic donations)

Staff

2008, including casual and sessional staff:

- Academic: 2,764
- General: 1,239
- Honorary clinicians: 1,906

Students

Full-time equivalent teaching load as at 30 September 2008:

- **Total students:** **6,909**
- Undergraduate: 5,423
- Postgraduate: 1,486
- Domestic: 5,497
- International: 1,412
- Onshore: 6,421
- Offshore: 488
- Higher degree by research: 659

Our vision and values

Monash University is committed to the highest quality in teaching, learning, research and a wide range of professional and community activities. The University believes in the value of free and rational inquiry, and in the pursuit of knowledge as a key to understanding and improving the human condition. Monash students and graduates are spirited and ready to take the initiative, self-reliant, egalitarian, contemporary and possess an international perspective.

Faculty values

The culture of the Faculty of Medicine, Nursing and Health Sciences reinforces high standards of ethical behaviour from staff and students.

The Faculty promotes principles of equity, egalitarianism and diversity.

Faculty vision

The Faculty is dedicated to the pursuit of excellence and innovation in its research and teaching. It aspires to leadership in all areas of research activity, and advocates for policy changes to improve health and social outcomes, and to fix health inequalities at local, national and international levels.

We aim to maintain Monash University's position as a leading international medical research university, recognised for the breadth and depth of its research, for its opportunities and postgraduate training programs, and as a thriving biotechnology hub.

The Faculty is committed to the translation of our biomedical and public health research through to health outcomes, working in partnership with our affiliated healthcare facilities and medical research institutes.

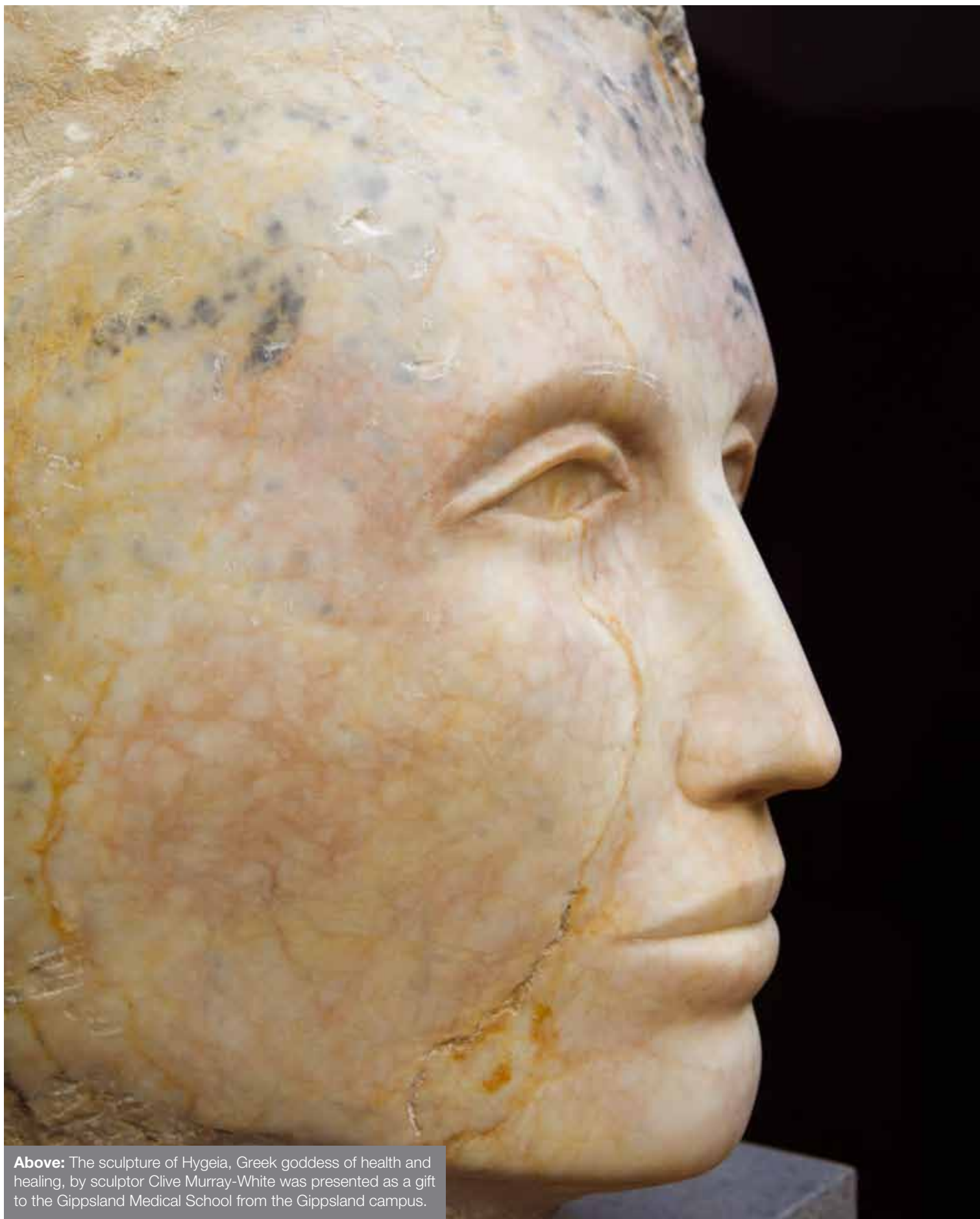
We are also committed to the internationalisation of research and scholarship, producing graduates that embody the values of the Faculty and the University.

The Faculty supports a management style that promotes autonomy and accountability.



Our graduates are:

- knowledgeable, skilled, reflective and compassionate
- innovative in their approach to and solution of problems
- aware of the latest advances in their field and in a position to fully engage in the expanding knowledge base of biomedical sciences
- skilled at assessing, appraising and applying the best available evidence to their everyday practice, whatever their core discipline
- able to demonstrate awareness of the social, ethical, economic and environmental context of health and illness and psychological wellbeing and delivery of care
- committed to the health of the population as well as to the wellbeing of individuals
- concerned with issues of equity, quality, humanity and healthcare, and able to act as advocates for the disadvantaged and dispossessed
- committed to the healthcare disciplines and to achieving excellence in both the art and science of their professions
- prepared to maintain high standards throughout their professional life with life-long learning
- able to integrate their broad education with a tolerance for ambiguity and for differing views
- in the case of our PhD programs, educated and inspired scientists able to play a major role in the frontiers of medical and health sciences knowledge; and
- willing to work in multidisciplinary teams.



Above: The sculpture of Hygieia, Greek goddess of health and healing, by sculptor Clive Murray-White was presented as a gift to the Gippsland Medical School from the Gippsland campus.

A multi-campus faculty



Clayton

Set on 100 acres of landscaped grounds, the Clayton campus is a community in itself, with shops, food, banks, theatres, a cinema, and extensive sporting and recreation facilities. The original and largest Monash campus, Clayton also houses Australia's largest biomedical sciences precinct – MBio.

Clayton's excellent facilities provide many opportunities for students to balance study with sports and an active social life, and Melbourne itself is ranked as one of the world's most livable cities.

The Hargrave-Andrew Library, one of eight library branches, holds an impressive medicine and health sciences collection to support and resource the learning, teaching and research activities of staff and students at the Clayton campus. In addition to its reference collection, the library also has an extensive map collection, a major standards collection and an audiovisual collection.

The Faculty's flagship undergraduate degree, the Bachelor of Medicine/Bachelor of Surgery (MBBS), is offered at Clayton, together with courses in behavioural neuroscience, biomedical science, nutrition and dietetics, radiography and medical imaging, and a range of combined degrees.



Above: The Monash biosciences precinct connects cutting-edge research platforms with expertise in a broad range of health-related fields.

Left: A view of the Clayton campus.



Malaysia: School of Medicine and Health Sciences

In 1998, Monash University was invited by the Malaysian Government to open a campus, and became the first trans-national university campus established there. Located in the self-contained township of Bandar Sunway, the 12-acre campus is a joint venture between Monash University and the Sunway Group, operating through its Sunway Education Trust Fund.

Monash University aspires for its campus in Malaysia to be a medium-sized university by 2015, distinctive for its quality of teaching and for its research, particularly in the area of neuroscience.

The Faculty delivers its five-year undergraduate Bachelor of Medicine/Bachelor of Surgery (MBBS) at the campus, tailoring the curriculum to accommodate cultural differences. Students are based at the Clinical School in Johor for years three to five, with clinical studies centred in the Sultanah Aminah Hospital – a tertiary and referral hospital in Johor Bahru. Johor Bahru is at the southern-most point of the Malaysian Peninsula (just across the causeway from Singapore).



Peninsula campus: health by the bay

The Peninsula campus is an important part of Monash University. The Faculty's Peninsula students study an exciting range of courses, including nursing, physiotherapy, health sciences, occupational therapy, and emergency health (paramedic). The Peninsula campus is situated close to the Frankston Hospital, allowing easy access to student clinical training environments.

Set 40 kilometres south-east of Melbourne, it is located in the bayside suburb of Frankston, gateway to the Mornington Peninsula. After joining Monash in 1990, the campus has grown to accommodate more than 3,300 students.



Gippsland campus: Gippsland Medical School and School of Nursing and Midwifery



Above: Students at the Gippsland Medical School benefit from a fresh, new study environment.

Located approximately 160 kilometres east of Melbourne, and close to the idyllic town of Churchill, the Gippsland campus is a unique rural slice of Australia's largest university. The campus leads the way internationally in offering regionally-focused teaching, learning and research.

On campus, the new Gippsland Medical School offers its graduate students an insight into the nature of rural medicine. Meanwhile, the School of Nursing and Midwifery delivers undergraduate and post-registration degrees in nursing.

Other locations

Faculty courses are also offered at the Caulfield campus (social work, psychology) and the Berwick campus (psychology).

The Monash MBBS curriculum is also delivered at the newly established College of Medicine at the University of Sharjah in the United Arab Emirates (see page 92).

Clinical placement programs and research also take place at many hospital locations throughout metropolitan and rural Victoria.

MBio: Australia's new nucleus for biomedical science



By early 2009, the Monash Clayton campus will house the largest biosciences precinct in Australia.

MBio encompasses Monash's biomedical science research programs, platforms and facilities – together with Australia's most innovative undergraduate and postgraduate teaching and learning programs. Its multidisciplinary breadth and depth includes biosciences elements of the faculties of Engineering and Science.

The physical MBio precinct at Clayton campus is centred upon three new purpose-designed buildings located on the western side of the Clayton campus, and includes the adjacent School of Biomedical Sciences facilities (see pages 18–19).

In a construction process staged over several years, the new Buildings 76 and 77 within the core MBio precinct are nearing completion, with 17,000 square metres of floor space accommodating approximately 540 staff and students. This space includes central administration offices, research offices and laboratories, all designed to be adapted to almost any research group.



The elements of the Faculty located within the MBio precinct include the School of Biomedical Sciences, the Australian Regenerative Medicine Institute (see page 44) and the Monash Antibody Technologies Facility (MATF) – together with a range of research platforms (see page 82) and centres including the Australian Research Council (ARC) Centre of Excellence in Structural and Functional Microbial Genomics, and the National Health and Medical Research Council (NHMRC) Centre for Proteomics. The MBio precinct also houses the Australian Stem Cell Centre, and provides the base for European Molecular Biology Laboratory (EMBL) Australia, the local presence of EMBL.

The strong stream of molecular biosciences research within MBio includes teams working in cancer biology and structural bioinformatics and proteomics.

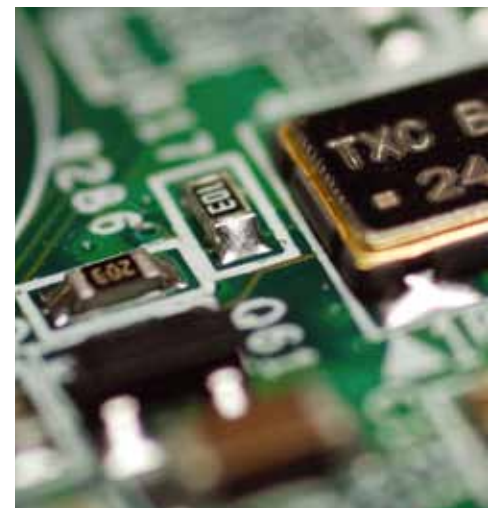
With its world class research, innovative technology platforms and contemporary facilities, MBio at Monash University is the new nucleus for biomedical science in Australia.

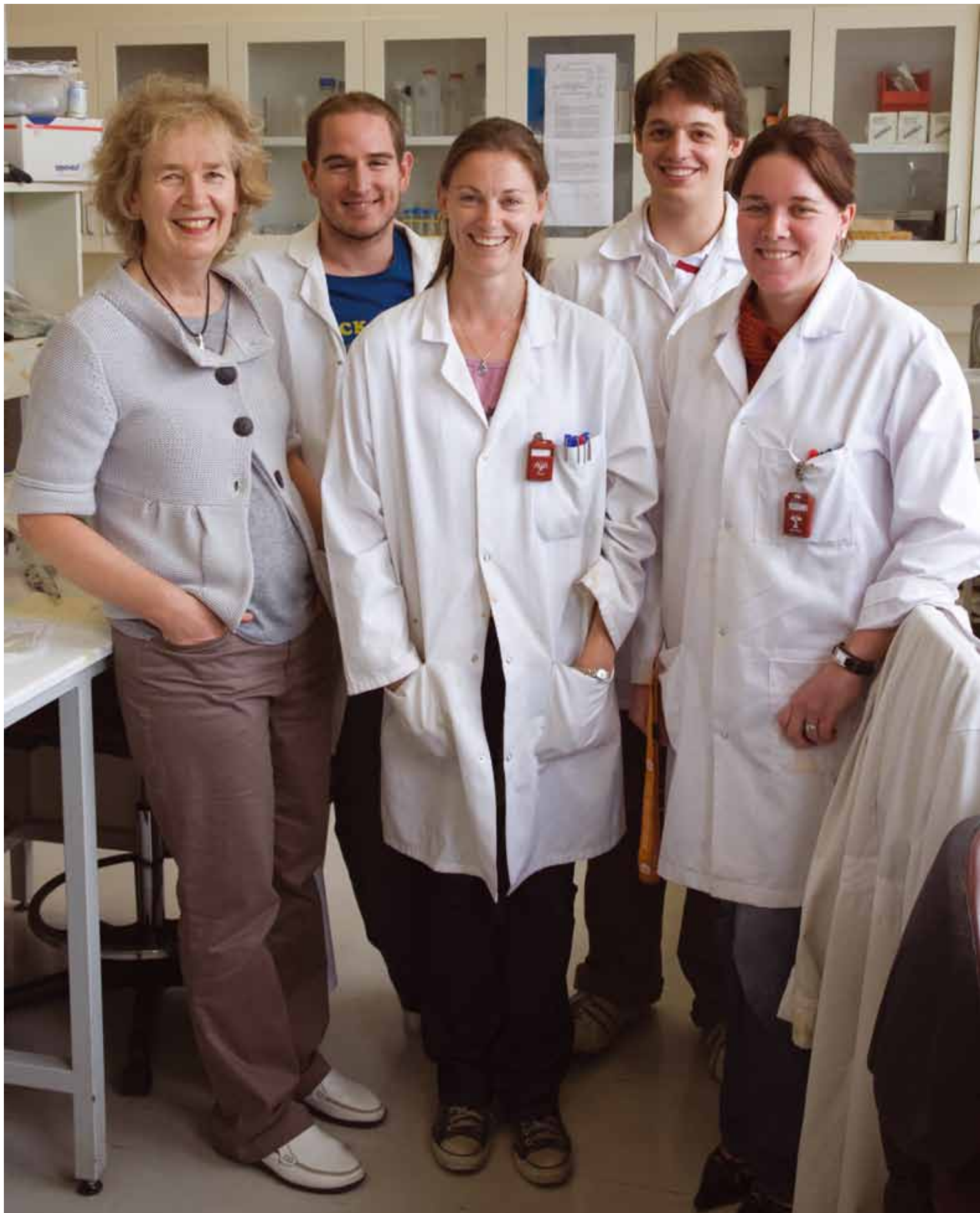


Above: The DARE (Depression Awareness Recovery Effectiveness) project, linked to the School of Psychology, Psychiatry and Psychological Medicine, investigates the effectiveness of Mindfulness-Based Cognitive Therapy, which combines behaviour therapy with meditation skills.

Schools of the Faculty

One faculty, ten schools...





School of Biomedical Sciences

Head of School: Professor Christina Mitchell

The School of Biomedical Sciences is the largest research node in the Faculty of Medicine, Nursing and Health Sciences and received half of the University's NHMRC grants for 2007, with a total research income of approximately \$62 million for 2007.

Around 450 researchers and 280 higher degree research students utilise the state-of-the-art facilities of the Faculty's MBio precinct, and work across a range of disciplines.

- **Cancer:** regulation, cell signalling and drug development.
- **Developmental biology:** heart, lung, kidney, gut and skin development.
- **Fetal and baby health:** maternal diet and health outcomes in embryos and through to adulthood.
- **Immunology and stem cell research:** kidney disease, multiple sclerosis and cell transplantation; immune system repair following cancer treatment.
- **Infectious diseases:** malaria, tuberculosis, animal pathogens and vaccine development.
- **Neurosciences:** facial recognition, sensory processes, behavioural and physiological consequences of stress.
- **Obesity:** metabolism, biochemical pathways and over-eating triggers.
- **Pharmacology and drug design:** jellyfish and snake venoms; cardiovascular disease biology, treatment and diagnosis.

- **Radiation sciences:** anatomical and functional imaging of humans and animals, and radiation therapy.
- **Structural biology and bioinformatics:** structure and function of molecules.
- **Vascular health:** causes of high blood pressure and heart failure.

Centres within the School include the ARC Centre of Excellence in Structural and Functional Microbial Genomics and the Centre for Vascular Health.

Our School generates research funding and publications comparable to that of leading medical research organisations in Victoria, outperforms peers on undergraduate education, and will amalgamate with partners in mid-2009 to become MBio – an expanded biomedical precinct at the Monash Clayton campus (see pages 14–15).

As part of our vision, we plan to develop the next generation of research leaders, build upon our academic strengths and – together with commercial partners – translate our findings for improved treatments for immune disorders, cancer and cardiovascular diseases.

www.med.monash.edu.au/sobs

Left: Professor Mitchell with some of the young scientists from her lab team of 21 people. A haematologist and cancer researcher, Professor Mitchell also studies the muscle-wasting disease facioscapulohumeral dystrophy – work that is supported by philanthropist Bill Moss AM.



Central Clinical School

Head of School: Professor Napier Thomson

Located at The Alfred Hospital, the Central Clinical School is part of The Alfred Medical Research and Education Precinct (AMREP). It is one of the Faculty's most visible locations for the translation of research into a clinical setting.

The School includes the Australian Centre for Blood Diseases (ACBD) and the Departments of Medicine, Immunology and Surgery. Many Monash appointments are mirrored within The Alfred's hospital structure, including those of the heads of department. For example, Professor Napier Thomson, a renal physician and Head of School, is also the Head of Medicine for The Alfred.

The School's multidisciplinary approach is evident from its expertise in the field of organ transplants. While immunologists work on solutions to the problems of tissue rejection, transplant physicians guide the patients through the aftermath of the surgery.

Other research areas in the School include infectious diseases, immunopathology, allergy and asthma, autoimmunity, neurosciences, cell and vascular biology, endocrinology and respiratory immunology, including cystic fibrosis.

Led by neurosurgeon Professor Jeffrey Rosenfeld, the Department of Surgery contributes significantly to postgraduate clinical and research training, and is a major contributor to surgical research.

The School also incorporates the Women's Health Program and the Centre for Ethics in Medicine and Society, which investigates areas including obesity and complementary medicine.

The ACBD provides specialist haematology services to over two million Melbournians, and continues to develop world-leading research and education programs.

www.med.monash.edu.au/cecs

Left: Professor Jeffrey Rosenfeld, neurosurgeon and Head of the Department of Surgery.



Southern Clinical School

Head of School: Professor Stephen Holdsworth

With a head office at one of Melbourne's most important hospitals – the Monash Medical Centre (MMC) in Clayton – the Southern Clinical School's activities span teaching, clinical placements and translational research.

Its academics teach components of the medical course in medicine, surgery, paediatrics, and obstetrics and gynaecology. The Department of Nutrition and Dietetics and its undergraduate program also falls under the School.

The School oversees clinical placements within the Southern and Peninsula Health networks, supervising students as they refine their clinical skills at the MMC and at hospitals in Moorabbin, Kingston, Casey, Dandenong and Frankston. Southern Health is the largest hospital network in Victoria. Clinical academic staff all hold joint appointments with Southern Health and Monash University.

Research is a major focus of the school, and its strength in translational research activity makes it a leader in many areas.

Centres

- Centre for Inflammatory Diseases
- Centre for Cardiovascular Research
- Neurosciences Research Centre
- Nutrition and Body Composition Research Centre
- Diabetes Research Centre

Other research strengths

- rheumatology
- infectious diseases
- palliative care
- renal medicine
- respiratory medicine
- paediatrics
- surgery

Extensive research into common diseases such as arthritis and lupus is undertaken at the School's Centre for Inflammatory Diseases. Meanwhile, a team of neuroscientists led by geriatrician Dr Velandai Srikanth, work on mapping the human brain in older people with degenerative conditions.

The Southern Clinical School also fosters links with major research institutes such as Prince Henry's Institute and the Monash Institute of Medical Research, and with the medical research centres of its partner hospital groups.

www.med.monash.edu.au/scs

Left: Dr Velandai Srikanth, who leads a team of neuroscientists mapping the human brain in older people.



School of Primary Health Care

Head of School: Professor Leon Piterman AM

Situated at the Clayton satellite campus of Notting Hill, with departments at the Peninsula and Caulfield campuses, the School of Primary Health Care incorporates several departments and course streams:

- General Practice
- Health Science
- Occupational Therapy
- Physiotherapy
- Social Work; and
- Community Emergency Health and Paramedic Practice.

Centres and Units

- Centre for Developmental Disability Health Victoria
- Child Abuse Prevention Research Australia
- Primary Care Research Unit
- Gambling Research Centre
- Healthy Ageing Research Unit
- Obesity Research Unit
- Multicultural Health Unit

The School's research focuses on diverse issues relevant to general practice and primary healthcare, reflecting the variety of expertise among the academic team of clinicians and social scientists.

A strong emphasis on finding interdisciplinary solutions to health problems in particular chronic disease management, flows through to units within the School's courses in which students gain an understanding of how they can work with other primary healthcare professions.

Left: Dr Gerald Segal, a Monash alumnus and long-time mentor to students on General Practice rotations, with student Nandini Choudhury.

The School also accommodates the Centre for Developmental Disability Health Victoria, an academic unit led by Associate Professor Bob Davis, that aims to improve the health outcomes of people with developmental disabilities.

Child Abuse Prevention Research Australia is a collaboration between the Faculty and the Australian Childhood Foundation and is led by Professor Chris Goddard. Its staff work to provide evidence-based advice that shapes policies and practices to reduce the rate of child abuse, neglect and murder.

The Gambling Research Centre is a partnership with the University of Melbourne, funded by the Victorian Government. The Monash Director is Professor Shane Thomas, who is also Head of Primary Care Research.

www.med.monash.edu.au/sphc





School of Rural Health

Interim Head of School: Professor Gordon Whyte

Several major factors drive the establishment of rural health as a discipline:

- the recognition of the poorer health status of rural Australians
- the unique natures of rural and remote practice; and
- the realisation that policies and programs developed in urban areas often translate poorly into rural Australia.

The School's research focuses on improving the health and wellbeing of residents of rural, remote and regional communities, and on building the research capacity of rural health practitioners and stakeholders. Projects are directly relevant to rural communities and help to inform the development of government policy in relation to rural health services.

Four regional clinical schools sit under the School's leadership. In the north-west of Victoria, the Mildura and Bendigo clinical schools are developing a variation of the Monash MBBS program in collaboration with the Rural School of the University of Melbourne. This program is approved by both universities.

In the south-east, the Gippsland and East Gippsland clinical schools work closely with the Monash Gippsland Medical School to deliver a graduate version of the Monash MBBS program. These clinical schools play an important role in the School's recruitment, educational and vocational role, as well as its applied and clinical rural health research. They have laid down important primary healthcare networks in their regions and have contributed substantially to the resources in each rural city.

The Monash University Department of Rural and Indigenous Health (MUDRIH) is involved in education, research and consultancies across rural Victoria, as well as at a national and international level. MUDRIH has a special focus on Indigenous health workforce issues associated with rural nursing and on developing the rural workforce of the allied health professions.

www.med.monash.edu.au/srh



School of Nursing and Midwifery

Head of School: Professor Wendy Cross

The School of Nursing and Midwifery teaches a range of undergraduate, postgraduate and double-degree programs at multiple campuses, working closely with industry partners. In 2009, the School expands its operation to the Clayton campus.

Specialist nursing undergraduate programs are available in Psychological Studies and Rural Health, and double degrees are available in the Bachelor of Nursing/Bachelor of Emergency Health and the Bachelor of Nursing/Bachelor of Midwifery. Our popular postgraduate programs reflect the School's research interests in palliative care, rural health, children, mental health, midwifery, aged care, critical care and emergency, and advanced medical/surgical nursing. These programs include the new Master of Nursing Practice and Master of Clinical Midwifery.

Current research includes education in nursing, mental health, health services and operations management. Our rural health research examines workforce issues, models of care and community health problems. Research in midwifery focuses on disability, sustainable models of maternity care and maternity care experience. Researchers work in joint programs with some of the largest health organisations in Victoria, including Southern Health, Latrobe Regional Hospital and Peninsula Health.

Professor Margaret O'Connor AM holds the Vivian Bullwinkel Chair in Palliative Care Nursing, funded by the School in partnership with Peninsula Hospice Services, the Royal District Nursing Service and Peninsula Health. The strong research agenda in this area reflects the national strategic research directions of Palliative Care Australia, including service delivery and policy in palliative care, care of veterans, and the cultural aspects of care at the end of life.

www.med.monash.edu.au/nursing

Eastern Health Clinical School

Head of School: Professor Peter Gibson

The Eastern Health Clinical School is a new, independent school within the Faculty.

With headquarters at Box Hill Hospital, the activities of the Clinical School cover a wide area of Melbourne served by seven health service centres.

The School's three key activity areas are:

- medical student programs
- Eastern Clinical Research Unit (ECRU); and
- research.



Medical student programs

The Office of Medical Student Programs in the Eastern Health Clinical School is located at Box Hill Hospital and oversees the delivery of medical teaching at all Eastern Health sites for students in Years 3, 4 and 5 of the MBBS course. In 2010, Deakin University students will join the programs.

Currently, teaching occurs at Box Hill Hospital (Box Hill), Maroondah Hospital (Ringwood), Angliss Hospital (Upper Ferntree Gully), and Peter James Centre (Burwood East). Future Eastern Health sites include Wantirna Health (Wantirna), Healesville Hospital (Healesville), and Yarra Valley Community Health (Lilydale).

Eastern Clinical Research Unit (ECRU)

Under this umbrella organisation, staff at Box Hill and Maroondah Hospitals carry out high-quality translational research, predominantly sponsored by pharmaceutical companies. ECRU provides expert service in clinical trials for companies in the health and biotechnology sector.

ECRU at any one time is involved in more than 150 active clinical trials, with more than 1,500 patients. More than 40 clinical trial coordinators (nurses, dieticians, scientists) work with eight investigating groups: haematology, oncology, endocrinology, gastroenterology, hepatology, neurology, respiratory medicine, and nephrology.

ECRU Biotech, under the direction of Dr Anthony Dear, is the development arm of ECRU and conducts a number of translational research projects in multiple disciplines.

Research

Major research activities involve gastroenterology and nutrition and neurology. Newly formed groups also hold great promise in other specialties such as nephrology and educational research.

Gut disorders are a significant burden on the health and wellbeing of the Australian community. Irritable bowel syndrome affects one in six people, coeliac disease – one in 100, and inflammatory bowel disease – one in 200.

Dietary therapy, which is commonplace for the management of coeliac disease, is underdeveloped for the other chronic intestinal diseases. The School conducts a major program in the application of diet in the therapy and prevention of such diseases.

A major focus is on short-chain, poorly absorbed carbohydrates (FODMAPs) and their role in the genesis of functional gut symptoms and of Crohn's disease, as well as their mechanisms of action and their application in patients with these conditions.

Other dietary triggers of trouble in the gut are also being studied, including gluten in non-coeliac disease, chemicals and fat.

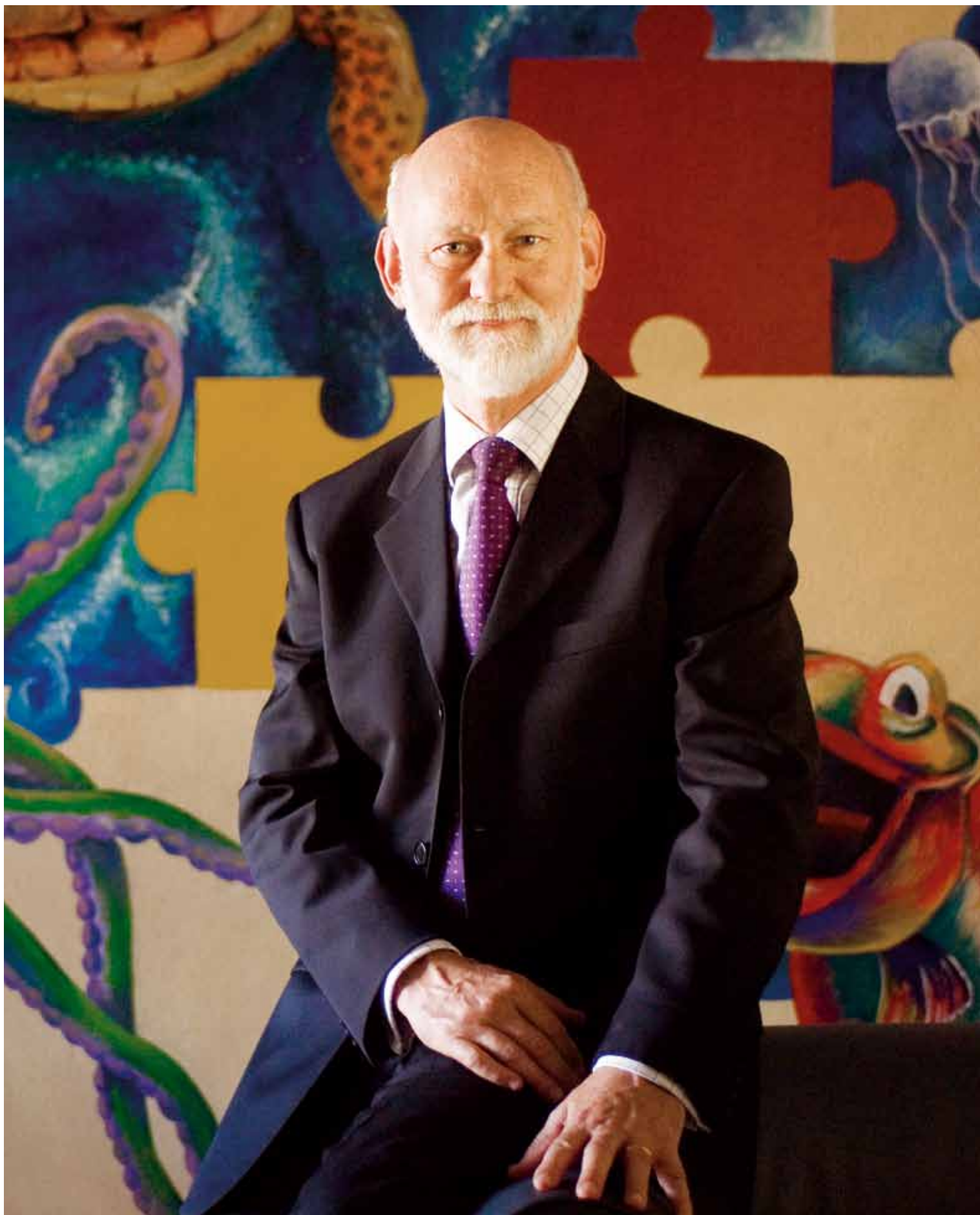
The School offers postgraduate opportunities in these fields, as well as in studies of coeliac disease and its assessment, novel treatment and outcomes. Research into inflammatory bowel disease includes evaluation of fatigue and the role of psychological factors and therapies in clinical outcomes.

An active academic program has been developed in three key areas: the epidemiology and genetics of multiple sclerosis (in conjunction with the Howard Florey Neuroscience Institute, and The Royal Melbourne Hospital), the assessment and treatment of stroke (including new 'thrombolytic' or clot-busting drugs from the Vampire bat and the Malaysian Pit Viper snake) and in novel approaches to the therapy of Alzheimer's disease.

Other strong research programs include haematology and medical oncology, cardiology, endocrinology, respiratory medicine and nephrology.

www.med.monash.edu.au/ehcs





School of Psychology, Psychiatry and Psychological Medicine

Head of School: Professor Bruce Tonge

The activities of the School of Psychology, Psychiatry and Psychological Medicine are divided into four key areas: research, education, and clinical and professional services.

The main research areas include:

- neuroscience and mental health
- animal welfare
- organisational psychology; and
- social sciences and health research.

The School is especially strong in the areas of developmental psychology and psychiatry, forensic mental health, health psychology and psychiatry, neuroscience and neuropsychology, and schizophrenia and depression.

Research projects range from laboratory-based research to applied, clinical or community-based investigations. Current projects include studies with human subjects in the Faculty's sleep laboratories in Caulfield, and the development of a protocol tool that will help shelters assess which dogs will make the best pets.

With experts located at numerous sites throughout Victoria, the School provides a broad range of services to the public through its consulting, clinical and advisory capacity, and offers a professional resource to promote community mental health and quality of life.

www.med.monash.edu.au/ppp



School of Public Health and Preventive Medicine

Head of School: Professor John McNeil

With more than 300 staff and a head office in The Alfred precinct's Burnet Tower, the School of Public Health and Preventive Medicine brings together four very unique entities:

- the Department of Epidemiology and Preventive Medicine, an established authority on infectious diseases, public health and environmental safety
- the Centre for Obesity Research and Education
- the Monash Institute of Health Services Research, located at the Monash Medical Centre; and
- the Victorian Institute of Forensic Medicine (VIFM), which doubles as the Department of Forensic Medicine.

The School brings together research strengths in fields as diverse as international public health, cardiovascular diseases, respiratory illnesses, sporting injuries, infectious diseases, biostatistics and travel health. Many researchers work with a broad objective of improving the lives of populations around the world, in Australian cities, and in our rural and Indigenous communities.

A major new project within the School, ASPREE (ASPIrin in Reducing Events in the Elderly), is measuring the long-term preventive benefits of aspirin among 10,000 healthy participants aged 70 years and over.

The School teaches students in undergraduate courses including the Bachelor of Medicine/Bachelor of Surgery, and also runs a range of postgraduate research and coursework programs in public health, biostatistics, health service management, occupational and environmental health and clinical research methods. VIFM teaches the only postgraduate courses in forensic medicine in Australia.

The School manages many registries – crucial tools that help health services to benchmark, maintain quality assurance in treatment, and assess the beneficial impacts of new therapies to Australia. These include registries for conditions such as cardiac arrests, cancer, physical trauma and respiratory conditions, and a new registry to track the outcomes of blood transfusions.

www.med.monash.edu.au/sphpm

Left: The ASPREE trial is a major project within the School.



Schools of Medicine

Associate Dean (MBBS Curriculum):
Professor Ben Canny

Head of Gippsland Medical School:
Professor Chris Browne

Head of School, Malaysia:
Professor Dato' Dr Anuar Zaini

As well as delivering courses at campuses in Clayton, Gippsland, Malaysia, and a range of rural settings, Monash's three medical schools are developing their own exciting research programs that specifically address local needs.

The Malaysian Medical School has attracted a number of Malaysia's foremost research academics, particularly in the field of neuroscience. Professor Ishwar Parhar heads up a team at the Brain Research Institute that is working to improve drug delivery to diseased brain cells, giving hope to people with brain-related illnesses. The team has developed a technique that allows for neurons of interest to be isolated with precision without damaging surrounding neurons.

At Gippsland, Associate Professor Daryl Pedler has a particular interest in rural injury, especially farm injury, and Associate Professor Elmer Villanueva is internationally recognised for his work on the organisation of health services by using the statistical process control methodology, the epidemiologic methodology, biostatistics, and evidence-based medicine.

www.med.monash.edu.au/medical/gippsland

www.monash.edu.my/medicine

Top left: Medical students in a tutorial at Gippsland Medical School.

Bottom left: Malaysian dignitaries in the simulation centre of the Tan Sri Jeffrey Cheah School of Medicine at the Sunway Campus.

Our Research...Your Future

The Faculty's research income represents nearly 60 per cent of the total research income of Monash University.

Our researchers are consistently recognised in competitive grant rounds of organisations such as the National Health and Medical Research Council, the Australian Research Council, the Cancer Council and the National Heart Foundation.

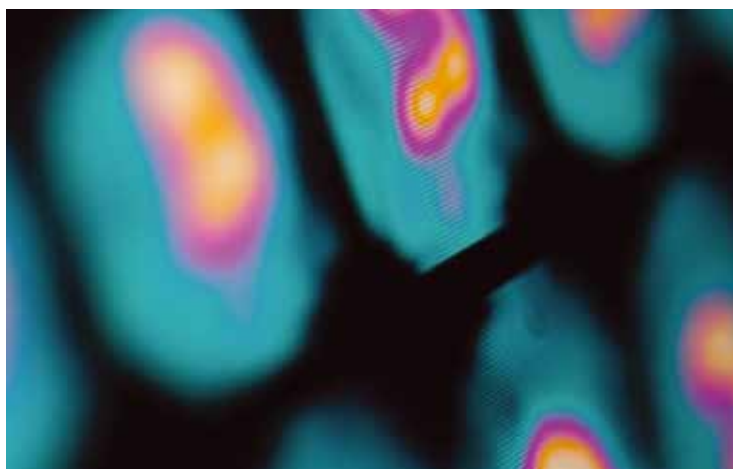
In the NHMRC's inaugural awards for Excellence in Health and Medical Research in 2007, Monash researchers won a quarter of the awards overall, a recognition of their strengths in fields such as neuroscience, fetal development, malaria and communication impairment.





In 2008, three of the national *10 OF THE BEST* research projects, as judged by NHMRC, went to Monash researchers.

With a range of sites at hospitals and other clinical centres throughout Melbourne, including an overwhelming presence at The Alfred Hospital and the Monash Medical Centre, our researchers are ideally positioned to translate their research from the laboratory through to the clinic.



The Faculty's 2008 forecast research income came to almost \$128 million. This comprised competitive grants, industry grants and Cooperative Research Centre funding.

Our Research...Your Future

Key Research Areas

- Regenerative medicine, stem cells and developmental biology
- Cardiovascular disease and thrombosis
- Cancer
- Structural biology and drug development
- Infection and immunity
- Inflammation, allergy and autoimmunity
- Health science, global health, public health and epidemiology
- Rural and indigenous health
- Mental health and cognitive neurosciences
- Obesity and metabolic neurosciences
- Men's and women's health
- Health education

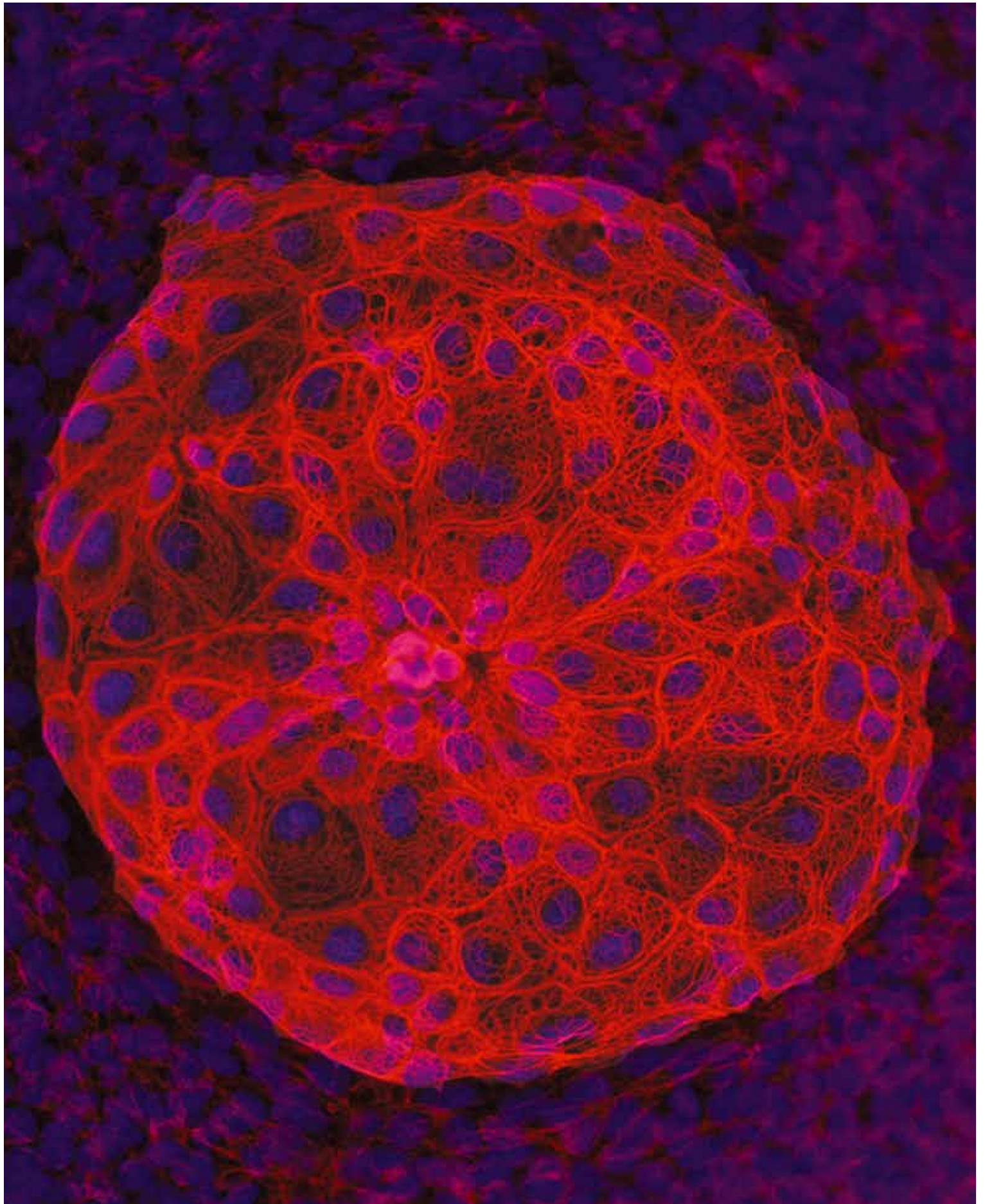


Monash Institutes of Health

The Faculty is a driving partner in the Monash Institutes of Health, a complex which draws together MBio and other research hubs within the University, the major teaching hospitals, and outstanding medical research institutes. These institutes are:

- Monash Institute of Medical Research (MIMR)
- Prince Henry's Institute of Medical Research
- Baker IDI Heart and Diabetes Institute
- Burnet Institute
- Monash Institute of Health Services Research; and
- Australian Regenerative Medicine Institute.





Monash Institute of Medical Research

With the aim of improving women's, men's and children's health, the Monash Institute of Medical Research (MIMR) pioneers research into stem cell biology, infertility, early development, inflammation and cancer.

MIMR is located at the Monash Health Research Precinct, a collaboration with Monash University, Prince Henry's Institute and clinicians and patients at the Monash Medical Centre.

MIMR's combined academic, biomedical research and hospital setting enables the Institute to effectively translate its research from 'bench to bedside' and to secure commercialisation opportunities.

MIMR research includes:

Cancer: cancer stem cells, tumour biology, cancer endocrinology and metastasis, cancers of the bladder, breast, brain, kidney, testes, prostate, stomach, endometrium, ovaries and lung (mesothelioma).

Early development: neonatal intensive care innovations, Sudden Infant Death Syndrome (SIDS), neonatal biology, Down syndrome, chronic lung disease in premature infants, childhood sleep disorder-related cognitive and behavioural impairments.

Embryology: reprogramming, transgenesis, stem cell isolation, somatic cell nuclear transfer, amnion-derived stem cells, embryo-maternal interaction and establishment of pregnancy, cloning livestock species.

Inflammatory diseases: basic research into the body's inflammatory response to infection, cancer, septic shock, hepatitis, asthma, chronic obstructive pulmonary disease (COPD), emphysema, lung inflammation, cirrhosis of the liver.

Men's health: prostate disease, testis development, male infertility, sperm biology, reproductive endocrinology, reproductive immunology and androgen disorders.

Andrology Australia, the Australian Centre of Excellence in Male Reproductive Health, is located at and administered by MIMR.

Pain medicine and palliative care: Acute post-operative pain, pain from degenerative diseases, cancer pain, and neuropathic pain caused by diseases such as diabetes and HIV/AIDS.

Women's health: endometriosis, menstrual dysfunction, endometrial stem cells, uterine fibroids, pre-eclampsia, miscarriage, preterm birth, growth-restricted babies, reproductive endocrinology and infertility.

Australian Regenerative Medicine Institute (ARMI)

Commencing operation at the Monash University Clayton campus in 2008, the Australian Regenerative Medicine Institute (ARMI) is a new \$153 million medical research centre within the Faculty of Medicine, Nursing and Health Sciences.

Established through a joint venture between Monash University and the Victorian Government, and with the financial support of the Commonwealth Government, ARMI enhances the University's existing strengths in biomedical research, and will support the critical infrastructure required to deliver the next generation of discoveries in regenerative medicine.

Regenerative medicine broadly refers to the repair or replacement of damaged human tissues and organs. It focuses on regaining the remarkable regenerative capacity of tissue that all people have before birth. This emerging field incorporates the use of cells, factors, and other biological building blocks, along with bioengineered materials and technologies.

At full capacity, the Institute will be one of the world's leading regenerative medicine and stem cell research centres. Its scientists will focus on unravelling the basic mechanisms of the regenerative process, enabling doctors to prevent, halt and reverse damage to vital organs due to disease, injury or genetic conditions.

This work will form the basis of treatments for conditions such as neurodegenerative disorders, diabetes, arthritis, musculo-skeletal and cardiovascular diseases.

The Institute will integrate research in three key platforms: structural biology (molecular level), cell biology (cell level) and regenerative biology (organism level).

The Institute will be the headquarters for the European Molecular Biology Laboratory (EMBL) Australia Partner Laboratory, a national network of research laboratories with research groups employed according to the philosophy and principles of the renowned EMBL research model. In this model, guaranteed basic research resources are provided to outstanding young researchers competitively selected from an international talent pool. The model gives these scientists the freedom to pursue discovery-based research and will position them to become tomorrow's scientific leaders.

Working with multiple centres and disciplines at Monash University across a number of faculties and with external agencies at a national and international level, including the CSIRO and the EMBL, the Institute will lay the groundwork for the development of future clinical applications, and will pursue rapid commercial transfer for its technologies.



Professor Nadia Rosenthal



Professor Peter Currie

Stem Cell Science

Research has demonstrated that stem cells provide unique opportunities to solve a range of debilitating medical conditions such as multiple sclerosis, cystic fibrosis, Alzheimer's disease, Parkinson's disease, Type 1 diabetes, cancer and spinal cord injuries. Scientists in the Faculty are among the world leaders in cell therapy research.

At the Monash Immunology and Stem Cell Laboratories

Located at the Clayton campus, the Monash Immunology and Stem Cell Laboratories (MISCL) was established to bring together world-class scientists who seek to integrate research into stem cells and immunology for the understanding of basic biological systems and development of novel clinical treatments. Research undertaken at MISCL includes studies on the basic biology of stem cells and germ cells, the potential to turn these cells into other cells, and their interaction with the biological control systems in the human body.

Investigators at MISCL study all forms of stem cells, including embryonic, newborn (umbilical cord, placental and amniotic), adult and patient specific stem cells. Embryonic stem cells provide a potentially infinite renewable source of cells and tissue for research and transplantation. Multipotential stem cells, of adult or placental origin, provide a readily available source of multipotent stem cells. Activating stem cells that already exist in a patient's own body or delivering therapies containing adult-sourced or embryo-sourced stem cells creates opportunities for regenerating the human body in ways recently thought impossible.

The research undertaken by MISCL scientists includes directed differentiation of stem cells to form blood, pancreas, thymus, liver, lung, cartilage bone and germ cells, and the repair and regeneration of immune, respiratory, reproductive, kidney, liver, spinal disc and neural tissues.

MISCL is led by Professor Richard Boyd (see alumni profile on page 104). He studies the thymus – the organ responsible for generating immune protection, but which severely atrophies with age. His team researches the possibility for its reactivation in cancer patients receiving chemotherapy. Scientists at MISCL also study the immune system for novel strategies to treat autoimmunity, cancer and reversal of immunodeficiency and use the anti-inflammatory properties of mesenchymal stem cells (MSCs) to promote the repair of chronic and acute injury.

In his role as Director of MISCL, Professor Boyd is a key player in the relationship between stem cell research in Victoria and the work driven by the California Institute of Regenerative Medicine. The California Institute is an international powerhouse with a \$300 million annual budget. Former MISCL director and IVF pioneer Professor Alan Trounson is now its President.

Professor Graham Jenkin is Deputy Director of MISCL. His team focuses on several areas: the control of ovarian function during the cycle and in early pregnancy; the initiation and maintenance of early pregnancy; the development and wellbeing of the embryo and fetus; the initiation of normal and premature parturition; and the use of amnion derived stem cells and tissue matrices in repair and regeneration. These studies may lead to novel approaches using stem cells for the prevention of brain and lung damage during development of at-risk fetuses and neonates, and for the combination of amnion stem cells and tissue matrices in spinal disc repair.

Below: Professor Graham Jenkin with researcher Dr Rebecca Lim.





Above: Dr Caroline Gargett.

At the Monash Institute of Medical Research (MIMR)

MIMR's expertise in stem cell research has resulted in the isolation and characterisation of embryonic stem cell lines from humans, mice, cattle, sheep and horses. In addition, there is considerable interest in various adult stem cell populations.

In 2005, Dr Caroline Gargett's discovery of adult stem cells in the endometrium was acclaimed by scientists and clinicians worldwide. Today, Dr Gargett is using her breakthrough to examine whether endometrial stem cells play a key role in the development of common gynaecological disorders such as endometrial cancer and endometriosis. Dr Gargett plans to investigate whether her discovery could provide a ready source of stem cells for tissue reengineering for conditions such as pelvic floor prolapse. The NHMRC last year listed her as number one in its *10 OF THE BEST* guide to grant recipients for 2008.

Professor Paul Hertzog is working on differentiating embryonic stem cells into immune cells, and studying their responses to infectious and inflammatory diseases. Professor Hertzog's team also uses embryonic stem cells to create animal models of diseases such as inflammatory lung disease and mesothelioma (lung cancer).

Meanwhile, scientists believe rejection issues faced by organ transplant patients could be overcome if cells for transplantation were developed from embryonic stem cells and then genetically matched to the patient. Dr Paul Verma conducts research into organ transplant rejection through a process called somatic nuclear cell transfer. This technique produces specific cell types required by the patient, such as cardiac, kidney or neural cells. Dr Verma is also leading the way in cell reprogramming, which may provide alternatives to using eggs and embryos in stem cell research.

MIMR scientists also apply their stem cell research in the areas of animal biotechnology and animal health. Dr Verma's latest project investigates the use of equine (horse) embryonic stem cells to repair tendon, ligament, cartilage and bone damage in horses. Currently there is no treatment for these injuries, which can lead to a horse being euthanised. Professor Michael Holland is studying the transplantation of adult stem cells from one species into the testes of a second species to provide insights for infertility treatment and new contraceptive targets in animals. Professor Holland is working with Dr Verma and Associate Professor Kate Loveland to determine whether stem cells can be converted into gametes which could be used in assisted reproduction to produce embryos.



Work at the Australian Regenerative Medicine Institute (ARMI)

ARMI is a \$153 million medical research centre that opened at the Monash University Clayton campus in 2008 (see page 44). Regenerative medicine brings together several scientific fields including stem cell research, molecular biology and tissue engineering.

Professor Nadia Rosenthal is internationally-renowned for her work on the use of stem cells in muscle regeneration and heart repair. Her work focuses on embryonic heart development, ageing mechanisms, and stem cell-driven regeneration of neuromuscular and cardiac tissue.

An estimated 61 per cent of people who live through heart failure die within five years of the event. For those aged between 50 to 59 years around one person in 100 will develop the disease and the rate doubles for every decade thereon.

Human tissues have an innate ability to repair themselves, but tissue that grows back after injury rarely looks as good, or works as well, as the one it replaced. Understanding such differences between species could lead to strategies to re-grow lost or damaged human tissues and organs.

Professor Peter Currie, ARMI's Deputy Director, specialises in developmental biology. His research program focuses on zebrafish models of muscle disease, and utilises the Faculty's landmark FishCore facility of up to 6.5 million fish.



Early Human Development

The Faculty's work in early human development falls into several main groups: developmental origins of health and disease, and maternal-fetal medicine and baby health.

Developmental origins

The Developmental Origins of Health and Disease (DOHaD) area is quickly emerging as a major new research focus in basic and clinical medicine. DOHaD research focuses on the early origins of adult health and disease, since many diseases can be traced back to our embryonic, fetal and early childhood development.

Professor John Bertram, Head of the Department of Anatomy and Developmental Biology, is currently the Chair of the Healthy Start to Life research initiative, which supports and enhances research at Monash focused on embryonic, fetal and postnatal development, and the consequences of suboptimal development for adult health.

His research with Professor Richard Harding shows that even moderate alcohol consumption during the third trimester of pregnancy hinders fetal development in essential organs, including the kidney, lungs, brain and blood vessels.

Fetal medicine

Professor Euan Wallace leads the Maternal-Fetal Medicine group, which has an international reputation for its Down syndrome screening program and research into genetic abnormalities, recurring miscarriages, infections in pregnancy, pre-eclampsia and fetal growth restriction. He has particular clinical interests in high-risk pregnancies, including recurrent miscarriage, multiple pregnancy, hypertension and endocrine disease in pregnancy.

Professor Wallace and Dr Ursula Manuelpillai are both working on adult stem cells derived from the fetal membranes after birth. These cells show great potential for differentiation into a range of tissue types. In addition, they have immune characteristics which make them especially suitable for transplantation.

Baby health

The Ritchie Centre for Baby Health Research has pioneered SIDS Research and continues ground-breaking work on paediatric sleep and breathing disorders and medical device innovation for monitoring babies at risk.

Associate Professor Rosemary Horne is a world leader in understanding SIDS and its prevention.

Professor Victor Yu pioneered newborn intensive care in Australia. His work has ensured that tiny preterm babies survive at earlier gestation.

Dr Philip Berger's team of clinicians, engineers and scientists, in partnership with commercial investors, has developed novel monitors for breathing, lung expansion and movement disorders in fragile preterm infants.

Each year 250,000 babies are born in Australia. Of these, 40,000 newborns will require expert medical care, and 5,000 babies will require intensive hospital care.

DNA fingerprinting

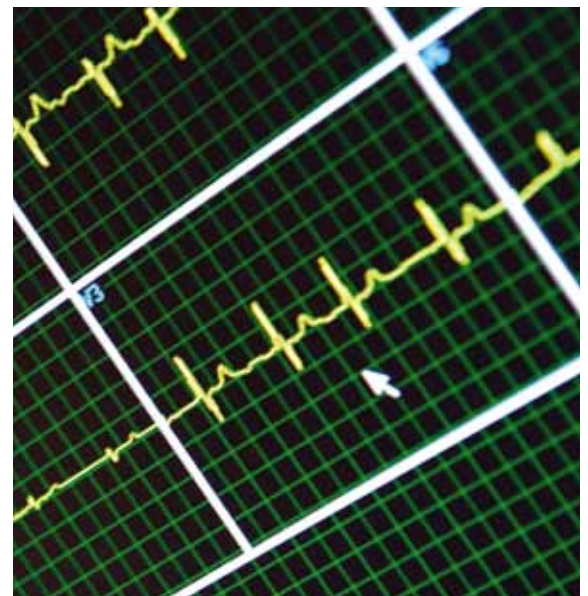
Dr David Cram, Dr Gayle Jones and Dr Orly Lacham Kaplan at the Monash Immunology and Stem Cell Laboratories (MISCL) lead the Stem Cell Therapies for the Reproductive and Genetic Disorders research group.

Last year, Dr Cram and Dr Jones published ground-breaking research in which they used DNA fingerprinting for the first time to identify which embryos had implanted after in vitro fertilisation (IVF) and developed successfully to result in the births of healthy babies.

The technique, combined with sampling cells from blastocysts (the very early embryo) before implantation in the womb, opened the way to pin-pointing a handful of genes that could be used to identify those blastocysts most likely to result in a successful pregnancy. The researchers believe that the discovery will revolutionise IVF by improving pregnancy rates and eliminating multiple pregnancies.

Below: Associate Professor Rosemary Horne (far right) with (from left) PhD student Heidi Richardson, Tallis Beasley and Wendy Winnall.





Cardiovascular Disease

Cardiovascular diseases are the number one cause of death worldwide and affect one in six Australians, or one in four individuals by the age of 50. Treatment often comes too late, resolves some symptoms but does not target the actual cause of the disease.

Interventional cardiology

Professor James Cameron is Director of the Monash Cardiovascular Research Centre (MCRC), which pursues a major ongoing commitment to cardiovascular research in the areas of arterial function and dysfunction in health and disease, and in developing the concept of 'ventriculo-vascular' interaction.

The research group works with an initiative of Southern Health known as MonashHEART. Professor Ian Meredith is both Executive Director of MCRC and Director of MonashHEART.

Elsewhere, the Centre for Vascular Health (CVH) unites scientists from diverse disciplines to conduct research and development programs on chip-based diagnostics, whole body imaging approaches, new therapeutic targets and candidate drugs. The aim is to achieve early detection, cure and prevention of cardiovascular disease.

The Director of the CVH, Professor Harald Schmidt, is also Head of the Department of Pharmacology, and has built an outstanding international research profile in vascular medicine and translational medicine. The Clinical Director, Professor Barry McGrath, is an eminent cardiologist. He heads the Monash University vascular sciences clinical research group. The Chief Scientific Officer, Dr Kirstin Wingler, has several years of commercial experience in cardiovascular drug development.

The major research direction of Professor Harald Schmidt and the Vascular Drug Discovery Group is to identify and target the underlying mechanisms of cardiovascular disease within the blood vessel, with the aim of preserving and improving health, and curing vascular disease rather than treating its symptoms.

Top and left: A participant in the SCREEN-HF trial at Caulfield Hospital having an ultrasound of his heart.

Epidemiology

The School of Public Health and Preventive Medicine has three research units that investigate drug therapies, lifestyle interventions, and the demographics of heart disease.

The research of Professor Henry Krum, Dr Dipak Kotecha and Dr David Eccleston looks for new ways to predict heart disease. The findings of their studies suggest that the risk of heart disease is more than three times greater if people have very stiff arteries or poor heart-rate variability. These markers could be as important as obesity, high blood pressure and diabetes for predicting heart disease in people at high risk.

Can low-dose aspirin curb the onset of disease in healthy older people? That's the question for researchers running the ASPREE (ASpirin in Reducing Events in the Elderly) project. Professor John McNeil, Head of the Central Clinical School, leads this project, which is determining the effect of low dose aspirin on cardiovascular disease, dementia, haemorrhagic stroke, preservation of cognitive function, depression and other health issues.

Clinical trials

Professor Andrew Tonkin is co-leader, together with Professors Henry Krum and Leon Piterman, of the Chronic Heart Failure Assisted by Telephone (CHAT) study, a randomised trial of telephone support for chronic heart failure patients at high risk of re-hospitalisation.

The trials carried out by the School of Public Health and Preventive Medicine at Caulfield Hospital are mainly cardiovascular disease prevention studies. SCREEN-HF (SCReening Evaluation of the Evolution of New Heart Failure) is a community-based trial assessing heart function in 3,500 patients who have high levels of BNP (brain-type natriuretic peptide), to determine their risk of developing heart failure. Quality of life and survival can be significantly improved if these levels are detected.

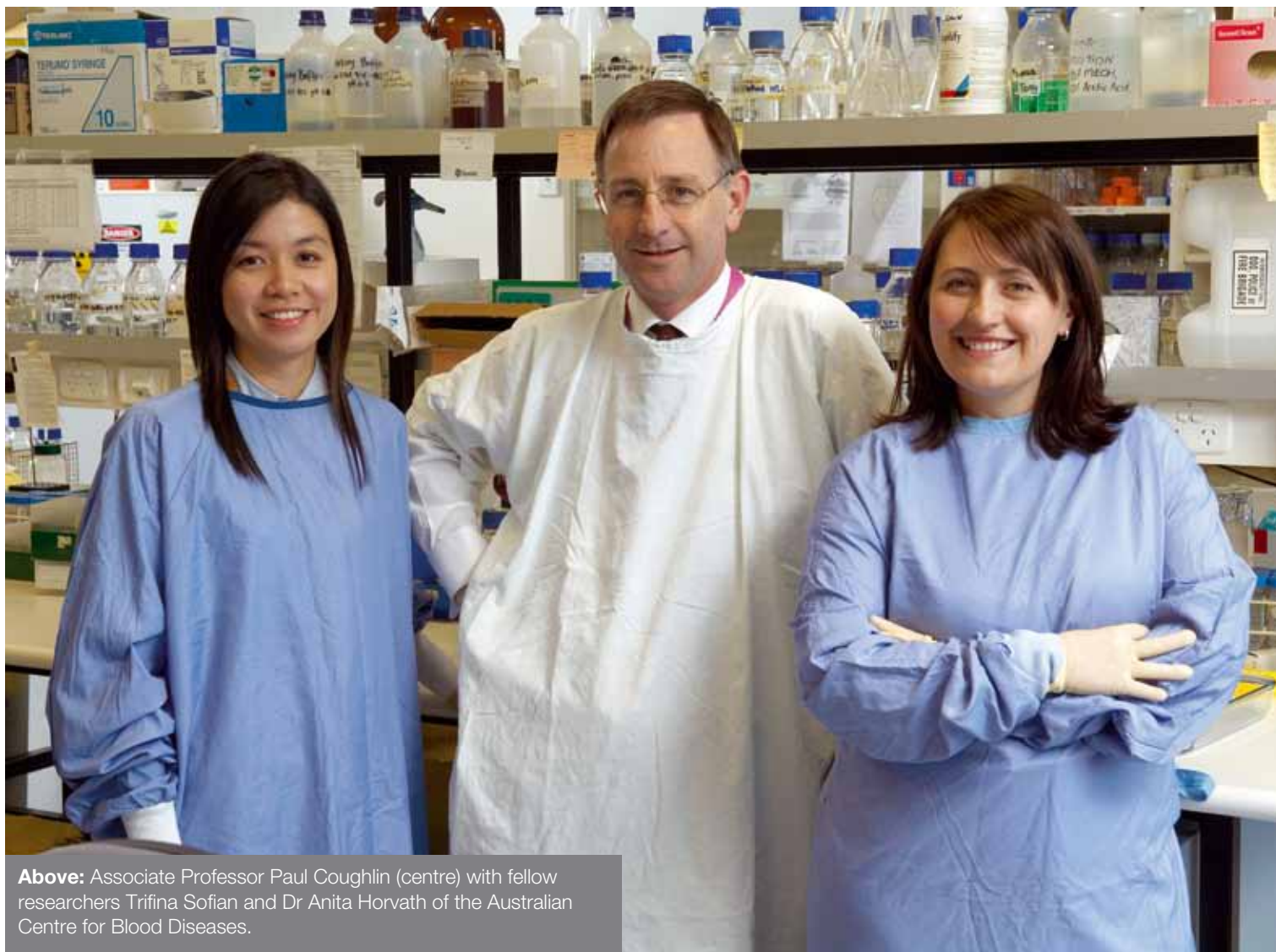
Blood diseases

The Australian Centre for Blood Diseases (ACBD), under the guidance of its Director, Professor Hatem Salem, brings together the skills and facilities of separate yet complementary organisations to improve our understanding of blood and its diseases. Research within the Centre focuses on:

- vascular biology: diabetes and arteriosclerosis
- stroke and brain injury
- blood cancers: multiple myeloma
- blood cell apoptosis: storage lesion
- blood clot formation: thrombosis (heart attack); and
- blood clot removal – fibrinolysis.

Professor Salem is a haematologist with a primary interest in the field of thrombosis. He has published more than 140 peer-reviewed articles in international journals, received numerous awards and grants throughout his career, and has supervised the training of many PhD graduates. In 2005, his vision and ability to develop leading clinical and research programs was recognised by the Victorian Government's Public Healthcare Award, where he was the recipient of the Health Minister's Award for Outstanding Individual Achievement. He is currently Executive Director of the Australasian Society of Thrombosis and Haemostasis. Professor Salem is supported by a strong group of researchers, including Professor Shaun Jackson.





Above: Associate Professor Paul Coughlin (centre) with fellow researchers Trifina Sofian and Dr Anita Horvath of the Australian Centre for Blood Diseases.

Professor Jackson is Head of the Thrombosis Research lab and a co-founder of the ACBD. He has received numerous awards in recognition of his research in haemostasis and thrombosis, including the inaugural Premier's Award for Medical Research (1995); an NHMRC R. Douglas Wright Award; the Australian Institute of Political Science Tall Poppy Award; Monash University's Silver Jubilee Research Prize (2001); the Rudolph Virchow Medal for Outstanding Contributions to Thrombosis Research, Würzburg, Germany; and the AMGEN Award from the Australian Society for Medical Research (2005).

Associate Professor Coughlin heads both the haematology and the haemostasis and thrombosis units at Box Hill Hospital. In 2007, he led a group of ACBD scientists that determined the structure of antiplasmin, a protein controlling the speed at which blood clots break down. This structure of antiplasmin is a foundation from which new drugs may be built that allow our bodies to more effectively break down clots. He collaborated on the study with fellow ACBD researchers Ms Trifina Sofian and Dr Anita Horvath, and with Dr Ruby Law and Professor James Whisstock from the Monash School of Biomedical Sciences.



Public Health and Epidemiology

The Faculty expanded its strength in this field last year with the establishment of the School of Public Health and Preventive Medicine at The Alfred Hospital.

Professor John McNeil leads the School, drawing on his principal interests of cardiovascular epidemiology, drug safety and toxicology.

Professor Andrew Tonkin, Head of the Cardiovascular Research Unit at the Department of Epidemiology, is currently involved in two projects related to the health of Australia's Indigenous population. The first, conducted in collaboration with Professor Brian Oldenberg, is concerned with circulatory health and disease in Aboriginal people in urban Brisbane populations. The second involves qualitative and quantitative research concerning cardiovascular disease determinants and management in Aboriginal people in central Australia.

The School is extending its international reach, especially within Malaysia, where a Monash-funded project based in the town of Segamat is at the centre of public health efforts to improve the prevention and management of chronic 'lifestyle-related' diseases like diabetes, hypertension and heart disease.

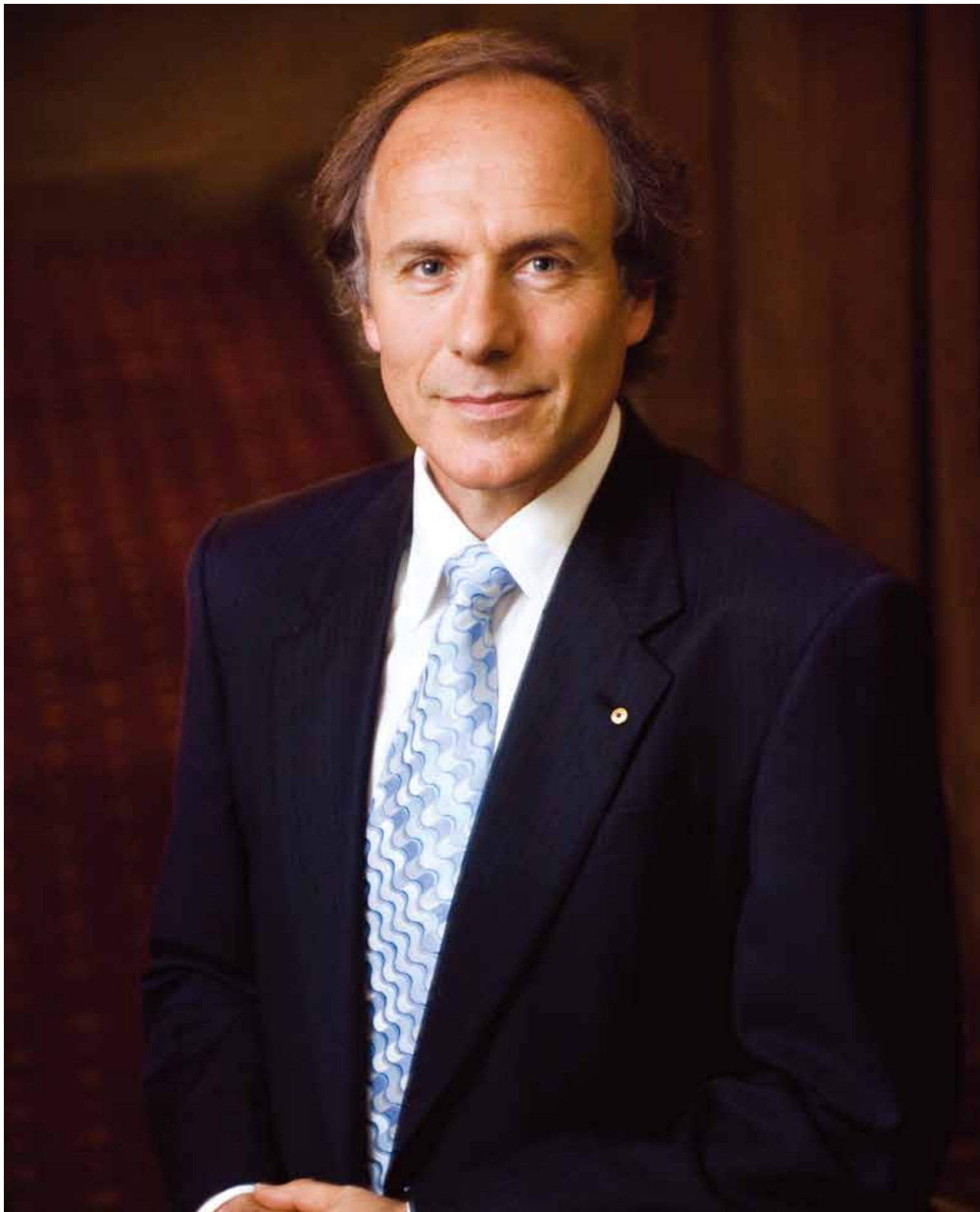
Associate Professor Shajahan Yasin of Monash Malaysia's Sunway Campus, along with a team of public health experts, are working on a project aimed to build capacity within the existing workforce of Malaysia's highly efficient health system to address chronic diseases at low cost.

Left: Research Assistant Emily Kelly from the School of Public Health and Preventive Medicine.

Top right: Members of the Biostatistics Unit at the School of Public Health and Preventive Medicine.

Bottom right: The Spiro-GP trial, which assesses spirometry (a test for lung function) as an early way of controlling chronic obstructive pulmonary disease and asthma, is one of the Faculty's many clinical trials.





Global Health

The Faculty's key values of equity and egalitarianism, as well as its presence at university and research sites around the world, make research into global health one of our key priorities.

This area of research aims to improve the health status of populations in resource-poor and developing countries.

Professor Leon Piterman, currently Professor of General Practice, Head of the School of Primary Health Care and Senior Deputy Dean, has been instrumental in establishing strong international links through research collaborations, professional relationships and, increasingly, the Faculty's international graduates.

The University's Chancellor, Dr Alan Finkel AM, personally supports this area of work. In May 2008, he announced that he and his wife Dr Elizabeth Finkel were making a philanthropic gift to endow a new chair in global health. The Finkel Chair in Global Health will be a leadership position that aims to improve global health by targeting communicable and non-communicable diseases and other causes of the burden of disease, including accidents and injuries and mental health. The work of the chair will consolidate and extend the Faculty's strong foundation of expertise in public and global health.

Left: Chancellor Alan Finkel, who has endowed the Alan and Elizabeth Finkel Chair in Global Health with his wife, Elizabeth Finkel.

Right: The entrance to the Sunway Campus in Malaysia, where new public health projects are developing.

International public health

The International Public Health Unit (IPHU) at the School of Public Health and Preventive Medicine aims to improve the health and wellbeing of residents in developing and less-developed countries. The team's research and capacity-building programs focus on improving health and wellbeing related to chronic diseases such as heart disease and diabetes, environmental health and HIV/AIDS. The research interests of unit head Professor Brian Oldenburg extend to strengthening health systems and policy issues and developing new approaches to prevent and manage non-communicable diseases in Australia and abroad.

With a focus on improving health globally, the unit's responsibilities also involve the development of relationships with other universities and research bodies in Australia and the Asia-Pacific region. In particular, the unit runs the Directorate for the Asia Pacific Academic Consortium for Public Health (APACPH), an academic network of more than 60 schools of public health in the region.





Health Science

Professor Helen Keleher leads much of the Faculty's health science research.

She has carved a strong reputation for her work, holding an appointment with the Women and Gender Equity Knowledge Network of the World Health Organisation's Commission on the Social Determinants of Health.

Her current research interests relate to the areas of health promotion, mental health and wellbeing, health inequalities, chronic illness and pathways to them via the social determinants of health, and gender and social inclusion.



Professor Keleher is also the President of the Victorian branch of the Public Health Association of Australia.

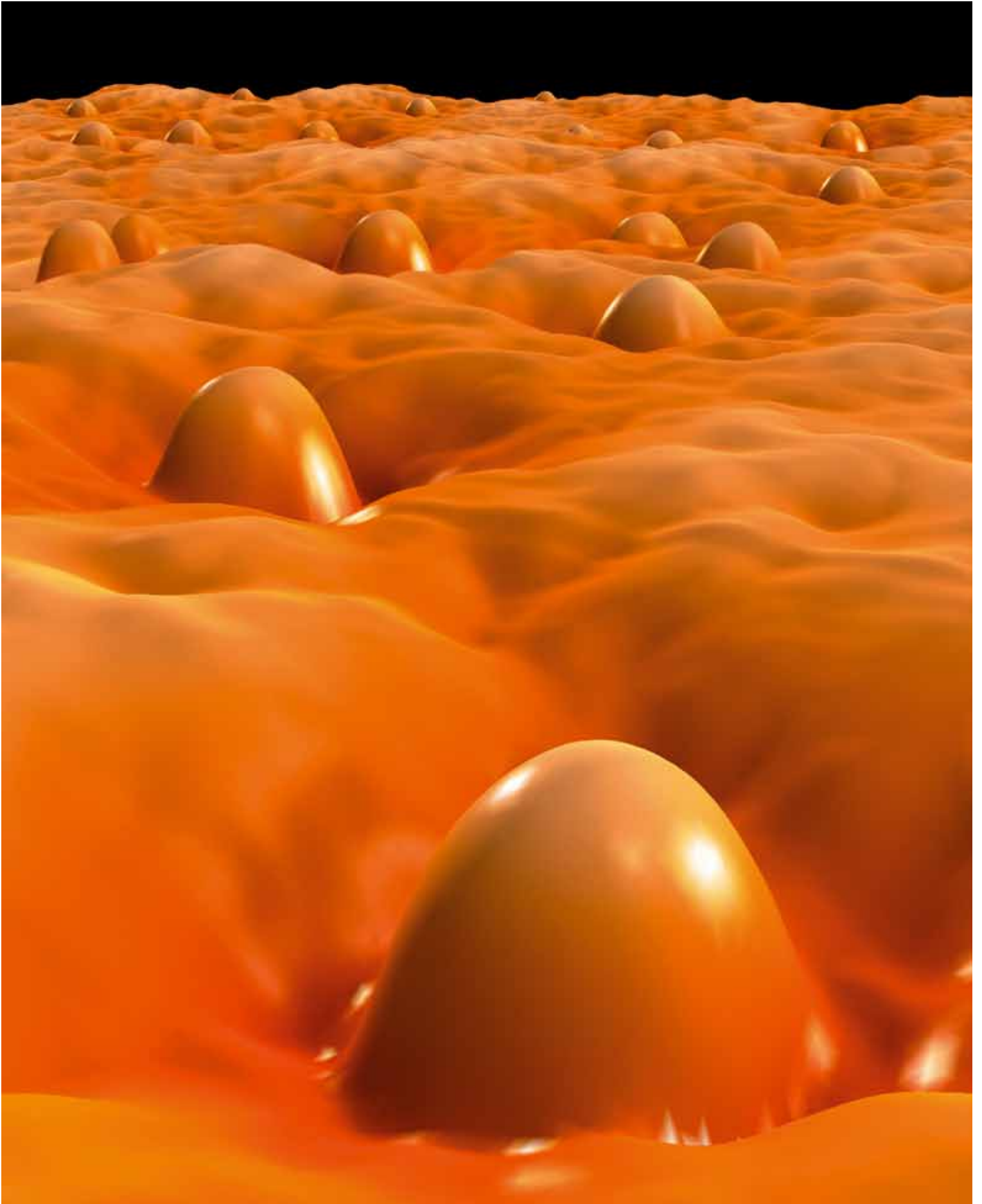
Within the School of Primary Health Care, Monash Research for an Ageing Society (MonRAS) drives a cross-faculty, multidisciplinary approach to the study of ageing. This approach brings together and focuses the research activities and resources of the entire University onto the development of devices, therapies, policies and programs that address significant issues and improve the quality of life of older people.

Professor Colette Browning, Director of MonRAS, is recognised as a national and international leader in psychology and health. She focuses on healthy ageing and improving quality of life for older people, as well as chronic disease self-management and consumer involvement in healthcare decision-making.

Also at the School of Primary Health Care, Professor Shane Thomas is the Director of Primary Care Research. His research interests include:

- problem gambling treatment research
- decision support tools and systems
- the development of key performance indicators and outcome measurement tools in research and evaluation
- hospital and primary care service quality improvement
- chronic disease and its clinical and self-management
- cultural factors in healthy ageing; and
- research in community and primary care services.

Left: Professor Helen Keleher, one of the Faculty's key health science researchers.



Infectious Diseases

Public health and infectious disease

The Faculty's Infectious Disease Epidemiology Unit, based at the School of Public Health and Preventive Medicine, focuses on issues including water quality and public health, and environmental impacts on infection.

Dr Karin Leder heads the unit. Her research interests include travellers' health, health issues in immigrants and refugees, and water-borne infections.

The unit also studies infectious diseases that pose problems in clinical practice, including post-operative infections and antibiotic-resistant micro-organisms.

Recently, the research activities of the unit expanded to include public health aspects of alternative water sources (including rainwater, grey water and recycled water). Such lower-quality water sources are used increasingly in urban areas for non-potable uses to conserve precious supplies of high quality drinking water.

Infectious diseases

Professor Ben Adler is co-convenor of the Monash Infection and Immunity Network, which brings together researchers from diverse disciplines within this field, from both various parts of the Faculty as well as from further afield.

Professor Adler's group uses global scale analyses such as genomics, proteomics and microarray technology – coupled with molecular biology and infection models – to investigate the interaction of pathogenic bacteria with their hosts at the cellular and molecular level. This includes the host response to infection. Infectious diseases under study include bacillary dysentery, melioidosis, leptospirosis, fowl cholera and swine dysentery.

Left: 'Cellular Renovations', an award-winning image captured by Associate Professor Brian Cooke and Steven Morton from the Faculty of Science, represents a view of the surface of a human red blood cell infected with a malaria parasite.

Ovine footrot is one of the most economically significant diseases of sheep in Australia. The causative agent is the anaerobic bacterium *Dichelobacter nodosus*. Research in Professor Julian Rood's laboratory has involved the cloning and analysis of gene coding for two of the major virulence antigens. Recently, the lab made a major breakthrough in *D. nodosus* genetics by developing a method for introducing DNA into this organism. This advancement has allowed genetic analysis in *D. nodosus* and more importantly, the study of the virulence of *D. nodosus*.

Malaria, which kills more than three million people each year, is central to the work of a research team led by Associate Professor Brian Cooke. His group also studies *Babesia* parasites, which cause a malaria-like disease in cattle, resulting in huge economic losses to the beef and dairy industries around the world every year.

Research into malaria is also carried out in Professor Ross Coppel's laboratory, focusing on the parasite *Plasmodium falciparum*. This complex organism is studied to identify proteins that play important roles in interacting with the human host, with the aim of developing a vaccine against malaria infection.

Immunity

At the Monash Institute of Medical Research, Professor Paul Hertzog, a co-convenor of the Monash Infection and Immunity Network, leads the Centre for Innate Immunity and Infectious Disease, conducting research into the molecular regulation of the innate immune response.

This early immune response determines how the body responds to infection by pathogens and has relevance for diseases such as hepatitis, lung infections and inflammatory disease, gastritis, gastric cancer and mesothelioma.

Inflammation, Allergy and Autoimmunity

The Centre for Inflammatory Diseases in the Department of Medicine at the Monash Medical Centre seeks to bridge the gap between basic experimental biology and clinical research. At the Centre, researchers apply both clinical and laboratory-based techniques to explore the mechanisms of inflammatory injury in human diseases.

Director and Professor Stephen Holdsworth focuses on the mechanisms in immune glomerular injury relevant to understanding and treating human glomerulonephritis (GN), a renal disease leading to inflammation of the kidney's small blood vessels.

Professor Ban-Hock Toh leads the Centre's autoimmunity team. He is internationally-recognised for his work on autoimmune gastritis and pernicious anaemia.

Within the Inflammatory Rheumatic Diseases laboratory, the major focus under the leadership of Associate Professor Eric Morand, is rheumatoid arthritis and systemic lupus erythematosus (SLE). Commonly known simply as lupus, SLE is a devastating autoimmune condition with the potential to affect multiple organs and end in death.



Allergy and asthma

At The Alfred hospital, Professor Robyn O'Hehir, Director of the Department of Allergy, Immunology and Respiratory Medicine, has been a key international figure in allergy and asthma research and clinical care for 20 years.

Her current research investigates the interface between innate and adaptive immunity in allergy and asthma.





Above: Associate Professor Eric Morand with a patient.

Diet and autoimmunity

The Eastern Health Clinical School at Box Hill conducts extensive research into dietary therapy, a common treatment for the management of coeliac disease, but under-developed in the other autoimmune intestinal diseases. The School conducts a major program in the application of diet in the therapy and prevention of such diseases.

A major focus is in short-chain poorly absorbed carbohydrates (FODMAPs) and their role in the genesis of Crohn's disease, their mechanisms of action, and their application in patients with these conditions.

The research laboratory arm has developed novel biochemical techniques to measure FODMAP content of foods, and the physiology laboratory has a range of hydrogen and ¹³C breath-testing methodologies, both of which provide key support for the translations of clinical studies.

Mental Health and Cognitive Neurosciences

Mental disorders rank third after heart disease and cancer as the largest causes of illness-related burden in Australia. They also represent the largest cause of disability.

Brain and mental health precinct

Plans are underway in the Faculty to relocate or co-locate many of the mental health researchers and neuroscientists from the School of Psychology, Psychiatry and Psychological Medicine into a single flagship building at Clayton, which will become a brain and mental health precinct.

This precinct will be bolstered by the opportunities for sharing of ideas within the Mental Health and Cognitive Neurosciences Network, which is a loose network of researchers who work in this area across the entire Faculty.

The precinct will provide a platform that will enable the entire Faculty to access the latest techniques in brain imaging, behavioural phenotyping and psychological screening, and will provide ready access to leading biomedical technologies and expertise, including proteomics, drug design and development, a biomedical beam line at the Australian Synchrotron, and proposed MRI and PET imaging facilities.

In the School of Psychology, Psychiatry and Psychological Medicine

Professor Bruce Tonge, head of both the School and the internationally-recognised Centre for Developmental Psychiatry, has a distinguished record of teaching and research in child psychiatry. His research and teaching interests in the area of developmental psychiatry particularly focus on:

- autism spectrum disorders
- behavioural and emotional disturbance in children and adolescents with intellectual disability; and
- treatment outcome studies in childhood anxiety and depressive disorders.

Meanwhile, Associate Professor Stephen Robinson's team investigates the protective roles played by astrocytes in age-related neurodegenerative disorders such as stroke and Alzheimer's disease. Astrocytes compose about 30 per cent of the volume of the central nervous system.

The Experimental Neuropsychology Research Unit, led by Associate Professor Nellie Georgiou-Karistianis, focuses its research on neurodegenerative movement disorders (Parkinson's disease, Huntington's disease and multiple sclerosis). The unit conducts other research into stroke, Alzheimer's disease and normal ageing, schizophrenia and depression, phantom limb perception, and neurodevelopmental disorders, including Tourette's syndrome, obsessive compulsive disorder, attention-deficit/hyperactivity disorder, autism, and Down syndrome.

Associate Professor Nellie Georgiou-Karistianis' group has developed a range of experimental behavioural tasks designed to examine cognitive and motor function in these conditions and in normal populations to elucidate differences in brain function in the various disorders and how these might be related to symptomatology.

The team also uses newly developed MRI technology to elucidate the earliest brain changes in individuals who test gene positive for Huntington's disease well before any symptoms manifest. This will help to identify the most sensitive and reliable biological markers for use in clinical drug trials in future.

Professor Julie Stout is also interested in presymptomatic Huntington's disease, and in understanding how the brain – especially the striatal-frontal brain systems – implement complex adaptive behaviours such as decision-making, social functioning, and processing of emotions.

At the brain cortex

Dr James Bourne's work on the brain cortex could one day lead doctors to an understanding of how to switch on the regenerative mechanisms in the brain following trauma to its visual components.

In 2007, Dr Bourne was recognised for his work with both a prestigious Career Development Award from the NHMRC and a commendation at its inaugural Awards for Excellence in Health and Medical Research.

Sleep

Dr Shantha Rajaratnam has conducted a randomised clinical trial of the effects of a melatonin agonist on human sleep and circadian rhythms, examining the efficacy of a fatigue management program in improving the health, safety and performance of police officers.

He is also conducting studies of the effects of sleep loss on alertness and cognitive performance and the use of light to reduce sleepiness in shiftworkers. He holds appointments at the Brigham and Women's Hospital and at Harvard Medical School in Boston, USA.

Dr Russell Conduit's research also focuses on the areas of sleep physiology, sleep disorders and novel treatment approaches, altered states of consciousness, such as dreaming, and electrophysiology. Dr Conduit is currently working with industry and international collaborators to develop pharmacological interventions for obstructive sleep apnoea.

Brain Research Institute, Monash Malaysia

Professor Ishwar Parhar leads the Brain Research Institute at Monash Malaysia, where his laboratory focuses on: reproductive and metabolic neuroendocrinology; development and neuroendocrinology of ageing; and the neurobiology of behaviour and mental health.

Prior to joining the Institute in January 2006, Professor Parhar spent 30 years working with leading research institutions including Rockefeller University in the US and the Nippon Medical School in Japan.

Successes at the Institute include the development of a technique that allows neurons of interest to be isolated with precision without damaging surrounding neurons. The marker-tagged, single-cell laser capture technique 'labels' neurons of interest with a fluorescent dye, allowing them to be easily located and then dissected. This then allows researchers to look at the genes in the neuron, and to compare the gene profiles of diseased and non-diseased neurons.

Top and middle:

A participant in a sleep study at the School of Psychology, Psychiatry and Psychological Medicine sleep lab.

Bottom: Dr Shantha Rajaratnam with collaborator Dr Steven Lockley from Harvard University.



Cancer

Cancer is a major burden on our community. It is not one disease but many, and research within the Faculty includes gender specific conditions such as breast, ovarian, testicular and prostate cancer as well as common cancers affecting the stomach, lung and bladder.

In the School of Biomedical Sciences

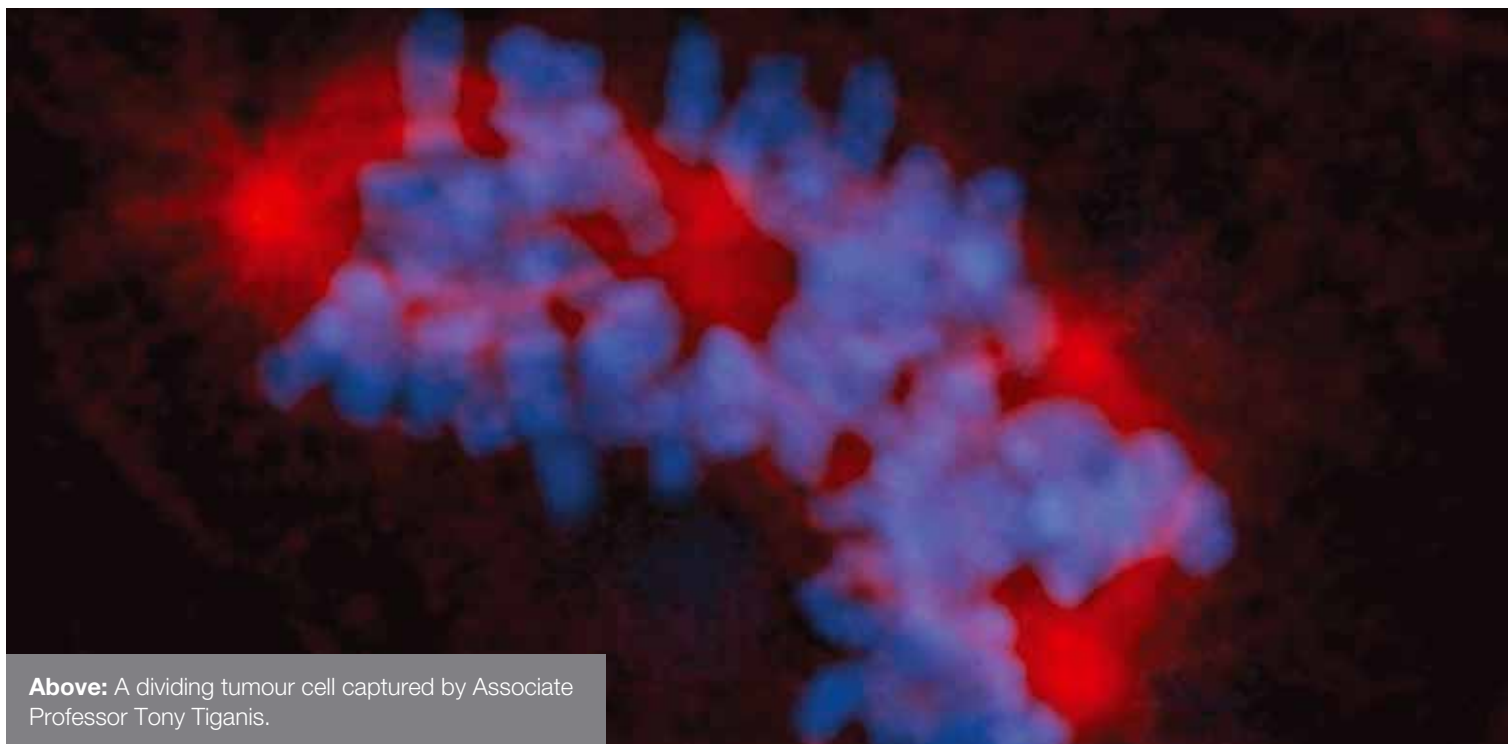
The research group led by Professor Christina Mitchell, Head of the School of Biomedical Sciences, currently pursues the identification and characterisation of novel proteins that regulate cell growth and differentiation.

The team of Associate Professor Tony Tiganis from the Department of Biochemistry and Molecular Biology has uncovered the role of a family of enzymes in the mutation of benign or less aggressive tumours into more aggressive, potentially fatal, cancers in the human body. The discovery provides valuable insights into how cancer cells develop and mutate, and could ultimately change treatment options for sufferers around the world.

Dr Martin Lackmann heads up the Faculty's protein interaction and cancer research lab, which concentrates on the molecular mechanisms underlying cell motility and cell positioning.



Above: Professor Bryan Williams.



Above: A dividing tumour cell captured by Associate Professor Tony Tiganis.

At the Monash Institute of Medical Research

International cancer researcher Professor Bryan Williams is the Director of the Monash Institute of Medical Research (MIMR) and also heads the Centre for Cancer Research, which looks at the genetic causes of cancer, its spread and early detection. His main research interests are in the relationship between the innate immune system and cancer and the development of therapies that take advantage of this knowledge. He also studies Wilms' tumour, a pediatric kidney cancer, with the aim of predicting outcomes and identifying therapeutic targets using genetic technologies.

Ninety percent of cancer deaths are caused by metastasis of the primary cancer tumour. Dr Elizabeth Williams works to identify key molecules involved in the metastasis of this cancer, which could have implications for cancers of the prostate, breast and lung.

Cancers contain a rare stem cell population that can regenerate the tumour from a single cell. Chemotherapy is effective in treating the majority of the cells in a tumour, but does not affect the tumour stem cells. These rare cells rely on a small number of embryonic signalling pathways for their ability to survive and regenerate. Professor Neil Watkins' studies in basic biology, preclinical models and clinical trials suggest that specific inhibitors of the embryonic signalling pathways can prevent tumour regeneration following chemotherapy, and provide the basis for a new approach to cancer treatment.

Clinical work

MIMR scientists and clinicians are driving a bid to establish the first national ovarian cancer screening program, which has the potential to save the lives of thousands of women.

Scientists are also working closely with the clinical breast oncology team at the Monash Medical Centre to identify breast cancer molecules in a bid to improve chemotherapy treatment. A team led by Professor Peter Rogers has received funding to study the effect of microbeam radiation on normal and tumour tissues, using the Australian Synchrotron, a unique approach to tailoring cancer radiation therapy which could revolutionise treatment worldwide.

MIMR scientists and clinicians are driving a bid to establish the first national ovarian cancer screening program that has the potential to save the lives of thousands of women.



Left: Associate Professor Matthew Watt, a prominent lab head in the Department of Physiology.

Right: Dr Samantha Thomas.

Obesity and Metabolic Neurosciences

Obesity is now universally recognised as holding dire consequences for modern society.

High rates of heart disease and diabetes are major killers, and are directly related to the prevalence of obesity. Other major health conditions resulting from obesity include respiratory diseases and some cancers.

Monash University's diverse range of obesity researchers have come together to form the Monash Obesity Research Initiative (MORI), providing a portal for government and community groups to access Monash expertise on this important issue.

At the CORE of obesity

The Centre of Obesity Research and Education (CORE) at The Alfred Hospital is a world leader in the study of obesity-related diseases and the benefits of weight loss. This Centre has a particular focus on clinical studies, public health, and the surgical treatment of obesity.

A four-year study, led by Professors John Dixon and Paul O'Brien from CORE, in 2007 found that obese patients with Type 2 diabetes who underwent the surgical procedure of gastric banding were five times more likely to have their diabetes go into long-term remission, compared to patients who engaged in conventional weight loss therapies such as a controlled calorie diet and exercise.

All in the brain

Neuroendocrinologists at the Department of Physiology, led by Professors Iain Clarke and Brian Oldfield, investigate mechanisms by which the brain controls energy balance, body weight and obesity.

A worldwide recruitment drive for the best young scientists in this field means that the researchers in the Department of Physiology now include Monash alumnus and VESKI Innovation Fellow Professor Michael Cowley, as well as Associate Professor Matthew Watt and Dr Zane Andrews.

Other research projects in the Faculty include:

- a collaboration between award-winning medical scientist Dr James Armitage and other researchers in Melbourne and London, aimed at understanding the impact of eating fats during pregnancy and the relationship of maternal diet to high blood pressure and obesity.
- the work of Professor Paul Komesaroff and Dr Samantha Thomas from the Centre for Ethics in Medicine and Society in developing more effective public health strategies for obesity; their work touches upon a range of issues, including the social stigmas inflicted upon people with obesity.



Indigenous Health

The Apology to Australia's Indigenous Peoples by the Prime Minister Kevin Rudd in February 2008 provides an important opportunity for universities to take action to address the long-standing negative health differences between Indigenous and non-Indigenous Australians.

Several schools and research groups within the Faculty are working to improve Indigenous health outcomes. Their projects address a wide range of research areas from mental health, to cardiovascular disease and men's health.

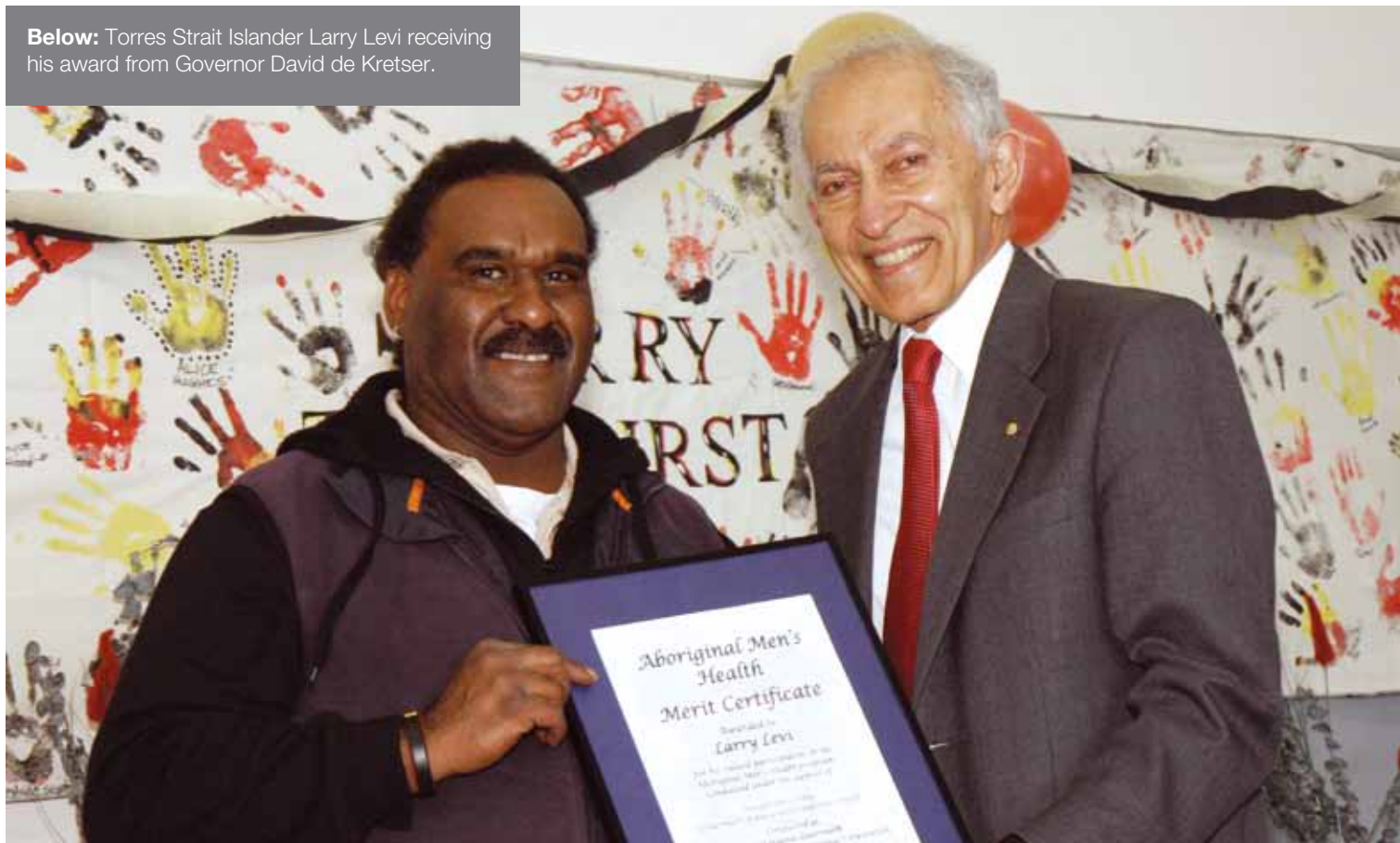
The Monash University Department of Rural and Indigenous Health (MUDRIH) in Moe leads the Faculty's Indigenous education and recruitment and retention activities. Associate Professor Marlene Drysdale leads the Department's Indigenous Health Unit and is active in the recruitment and retention of Indigenous medical and other health science students. Marlene recently received a Leaders in Indigenous Medical Education (LIME) award for her national leadership in Indigenous education.

MUDRIH's Indigenous Health Unit's guiding principles include recognising the diversity and uniqueness of Indigenous peoples, communities and cultures. Indigenous Australians need to have equal access to good healthcare and health careers as well as freedom from racism and discrimination.

Senior Lecturer Hilton Gruis has developed an Aboriginal Men's Health package for Andrology Australia. This innovative series of modules teaches Aboriginal health workers how to holistically address health issues with Aboriginal men. The package spans the life of a man from conception to his years as an elder, and encompasses health checks, diabetes, lifestyle and 'secret men's business'. It also looks at the disempowerment that has resulted from Aboriginal men's experiences with colonialism.



Below: Torres Strait Islander Larry Levi receiving his award from Governor David de Kretser.



Hilton Gruis has piloted part of the package with Aboriginal men in the Gippsland area. All participants in this pilot took part in a presentation ceremony with the Governor of Victoria, Professor David de Kretser. Two communities – one in Alice Springs and one in Western Australia – are also trialling the package.

MUDRIH has undertaken two key Department of Health and Ageing tenders. Associate Professors Marlene Drysdale and Janice Chesters compiled the learnings gained by small rural and remote Aboriginal communities across Australia as part of the Rural Chronic Disease Initiative. They used this data to develop and distribute high quality information on how to design and run a rural and remote chronic disease management project.

The Footprints Forwards: Better Strategies for the Recruitment, Retention and Support of Indigenous Medical Students project was undertaken from 2005 to 2007 by a consortium from Monash University, James Cook University and The University of New South Wales. The MUDRIH Indigenous Health Unit is now submitting a proposal to implement the *Footprints* findings nationally.

Rural Health

The School of Rural Health is Australia's leading researcher into rural health. Guided by its strategic goal of improving the health and wellbeing of rural communities, the School's research activity focuses on finding solutions to priority rural health problems – specifically measures to overcome rural health workforce shortages, ascertaining how best to provide appropriate health care services to small rural communities, and understanding the determinants of health that underpin current rural health disadvantage.

The strategic research undertaken by research staff from the School has had a very significant impact on the development of evidence-based policy and programs designed to address these issues.

The national understanding of these issues is significantly boosted through new knowledge generated from the School's research projects. National landmark studies undertaken include research on medical workforce retention, sustainable service models for small rural and remote communities, and the *Building Healthy Communities* resource kit.

Research staff work from four rural campuses spread across 1,000 kilometres, collaborating with governments, hospitals and health authorities, general practices and other rural health service providers, as well as key rural professional organisations and rural communities.

Below: Associate Professor Daryl Pedler, who is conducting ground-breaking research into farm injuries.



Rural health workforce

The rural health workforce research focuses on two key issues:

- what aspects of medical and health education and training increase the likelihood of graduates taking up rural practice; and
- what aspects of recruitment and retention require specific policies to support an adequate rural health workforce.

Professor John Humphreys, Professor Geoff Solarsh and Ms Judith Jones have investigated how rural exposure and devolved rural education influence choice of career and practice location, what factors influence rural workforce retention in Australia, and how doctors balance work and life factors in their decision about where to practice. Associate Professor Marlene Drysdale has led a national project investigating opportunities for, and barriers to, Indigenous student entry to medical education.

Rural health services

The demise of many rural and remote health services through rationalisation and centralisation has left a lot of small communities without access to adequate and much-needed healthcare. Professor Humphreys and Ms Jones have pioneered research into alternative, sustainable and innovative models of service delivery for residents of these communities. This involved one of the most comprehensive investigations ever undertaken in Australia into the economic, professional and organisational factors underpinning the viability of rural and remote practice.

A subsequent collaborative project with researchers from Flinders University and the Australian National University has investigated how best to deliver sustainable comprehensive

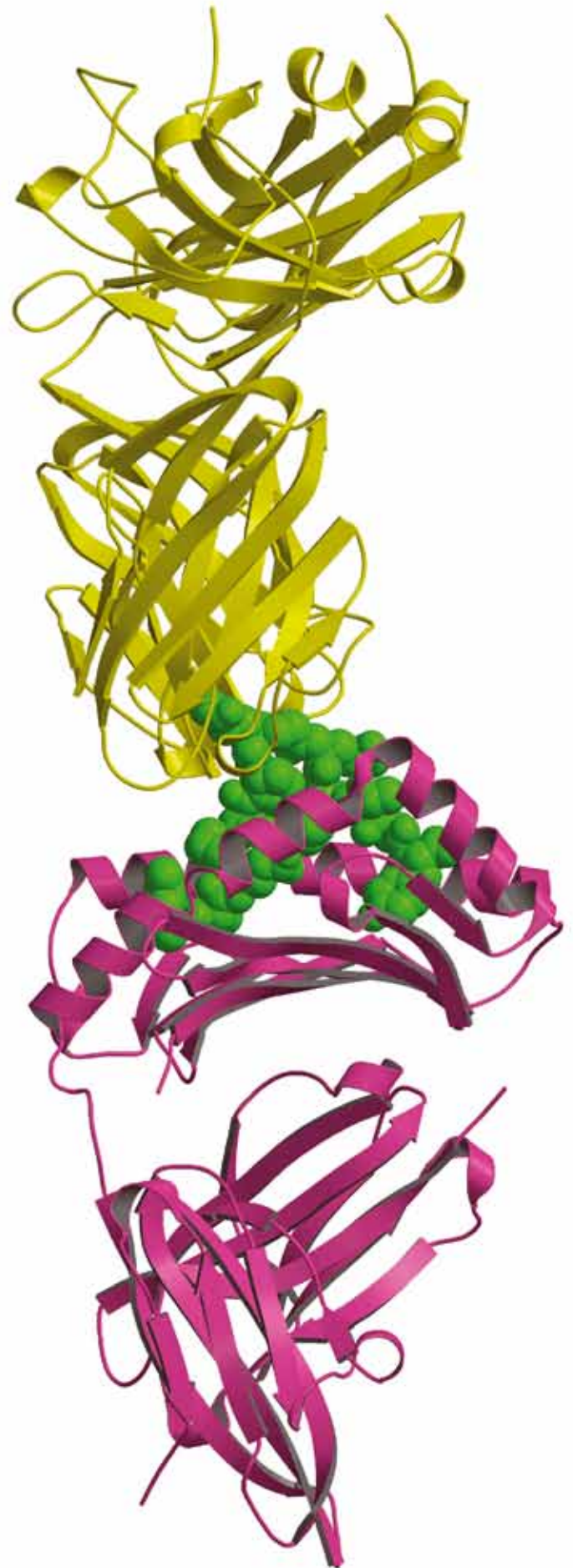
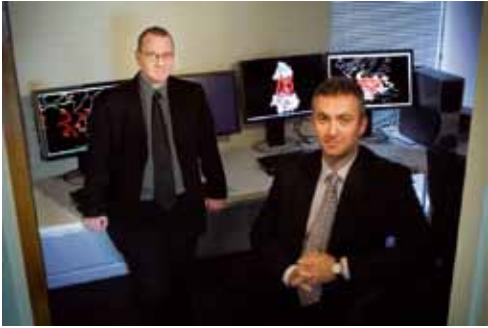
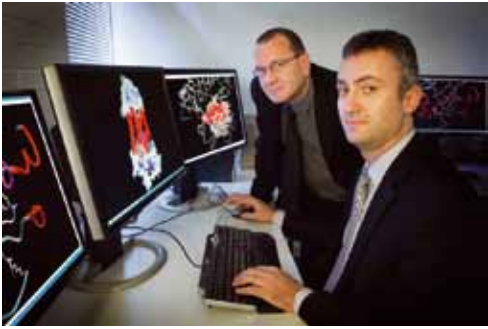
primary healthcare to these communities where currently none exists. Mr Leigh Kinsman, Dr Rachel Tham and Dr Sam Davis are undertaking important research on aspects of clinical pathways within rural hospitals, and oral health and person-centred care of the elderly in rural communities. The findings from these studies have informed national health debate and policies.

Rural health risk determinants

Australians living in rural and remote areas experience higher rates of chronic illness and injury than their metropolitan counterparts, leading to higher morbidity and mortality rates and consequent huge costs to the healthcare system. The need for effective health promotion, ill-health prevention and early intervention programs for residents of small rural and remote Aboriginal communities (many of whom are among Australia's most educationally and socio-economically disadvantaged groups) is a major challenge for governments, health authorities and communities alike.

Associate Professors Marlene Drysdale and Janice Chesters have investigated chronic disease in these communities across Australia as the basis for developing and distributing high-quality information on chronic disease management and developing local skills and leadership within small rural communities. The outcome from this multidisciplinary research – *Building Healthy Communities – a Guide for Community Projects* – has become a critically important training resource to inform people who want to try new ways to make a difference to chronic disease at a local level.

Professor Mark Oakley-Browne is leading the research on mental health issues in rural areas, and Karly Smith has undertaken important research reviewing the health status of rural Australians. Associate Professor Daryl Pedler, Director of the Gippsland Regional Clinical School, is undertaking research on the impact of farming injuries in rural communities.



Left: Professors Patrick Sexton (left) and Arthur Christopoulos.

Right: Simple schematic of the complex involving a T cell receptor (yellow), bound to an MHC molecule (pink) representing an extraordinarily long viral fragment (green). This structure was published in *Nature Immunology* in 2005. The lead author was Dr Fleur Tynan, a researcher in Professor Rossjohn's laboratory.

Structural Biology and Drug Development

Structural biology refers to the work of scientists who strive to unlock the exact shape of macromolecules. Monash researchers are leaders in the field, working closely with pharmacologists to discover new ways of designing therapies that fit into the shape of molecules relevant to many debilitating diseases.

Professor James Whisstock

Professor James Whisstock has spent the past nine years studying the structure and function of a family of perforin-like proteins which kill bacteria, virally infected cells and cancer cells. These proteins also play a role in developmental and neural biology.

In 2007, Professor Whisstock's group published the first three-dimensional structure of a perforin-like protein in the prestigious journal *Science*. The work showed that this disease-fighting molecule is also related to deadly bacterial toxins that cause anthrax, scarlet fever and flesh-eating disorders.

He has received multiple honours, including the 2008 Commonwealth Health Minister's Award for Excellence in Health and Medical Research, and the 2006 Science Minister's Prize for Life Scientist of the Year.

Professor Jamie Rossjohn

In 2007, Professor Jamie Rossjohn received the prestigious Gottschalk Medal for his insights into how killer T-cells recognise viruses. Professor Rossjohn currently leads the Protein Crystallography Unit in the School of Biomedical Sciences, and investigates three broad, yet interrelated areas of biomedical science - immunity, infection and rational drug design. His research program aims to provide answers as to how pathogenic bacteria cause disease, central questions relating to immunity, and the development of therapeutics to combat diseases.

His main approach is to study the three-dimensional shape of proteins using a technique called X-ray crystallography, a field that is dependent on synchrotron radiation.

Drug development

The work of Professors of Pharmacology, Patrick Sexton, Arthur Christopoulos and Roger Summers, joint Heads of the Drug Discovery Biology Laboratory, aims to improve the effectiveness of drug treatment for heart disease, mental illness, diabetes and obesity. They focus on G Protein-coupled receptors, the largest superfamily of all receptors and the prime target for almost half of all currently used therapeutic drugs. Professors Sexton, Christopoulos and Summers will soon relocate to the Monash Institute of Pharmaceutical Sciences in Parkville, intensifying their drug discovery efforts.

Another researcher in the School of Biomedical Sciences, Associate Professor Tracey Brown and her team of 14 scientists were early last year given the green light by the US Food and Drug Administration to start phase three clinical trials on a new form of chemotherapy that appears to double the efficacy of colon cancer treatment.

The drug model combines an existing drug known as irinotecan with a naturally occurring carbohydrate called Hyaluronic Acid in order to direct the drug to the cancer tumour like a guided missile.



Women's Health

The most common health conditions in women include diabetes, cardiovascular disease, dementia and breast cancer, and each result in substantial loss of quality of life.

Women's Health Program

Professor Susan Davis, Director of the Women's Health Program in the Department of Medicine of the Central Clinical School, hopes to change this by investigating disease prevention and health and wellbeing of women affected by these conditions.

One current research project, involving over 1,600 Victorian women, called the MBF Foundation Health and Wellbeing After Breast Cancer Study, aims to improve the quality of life of women living with breast cancer by documenting longitudinally the physical, psychological and socio-economic consequences for those affected.

Findings will provide a basis for the development of targeted management strategies for the issues affecting the greatest numbers of women and specific research into the areas of greatest need, and identification of issues that may not otherwise have been considered of significance.

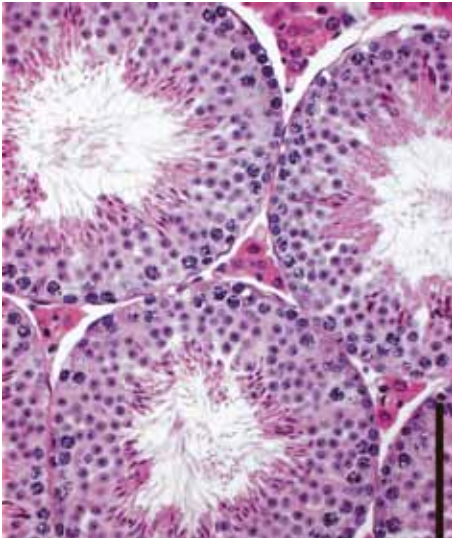
At the Monash Institute of Medical Research

MIMR is internationally-recognised for pioneering IVF in Australia for infertile couples. This research resulted in Australia's first IVF baby. Current research focuses on reproductive issues, women's cancers and maternal health, with particular emphasis on pregnancy disorders, uterine fibroids, endometriosis, urogynaecology, contraception and infertility.

Centre for Women's Health Research Director, Professor Peter Rogers' major area of research includes work on angiogenesis (the growth of new blood vessels).

Scientists from the Centre for Women's Health Research were the first in the world to discover adult stem cells in the lining of the uterus. Dr Caroline Gargett has since been recognised for her ground-breaking research in examining the role of these cells in endometriosis and endometrial cancer.

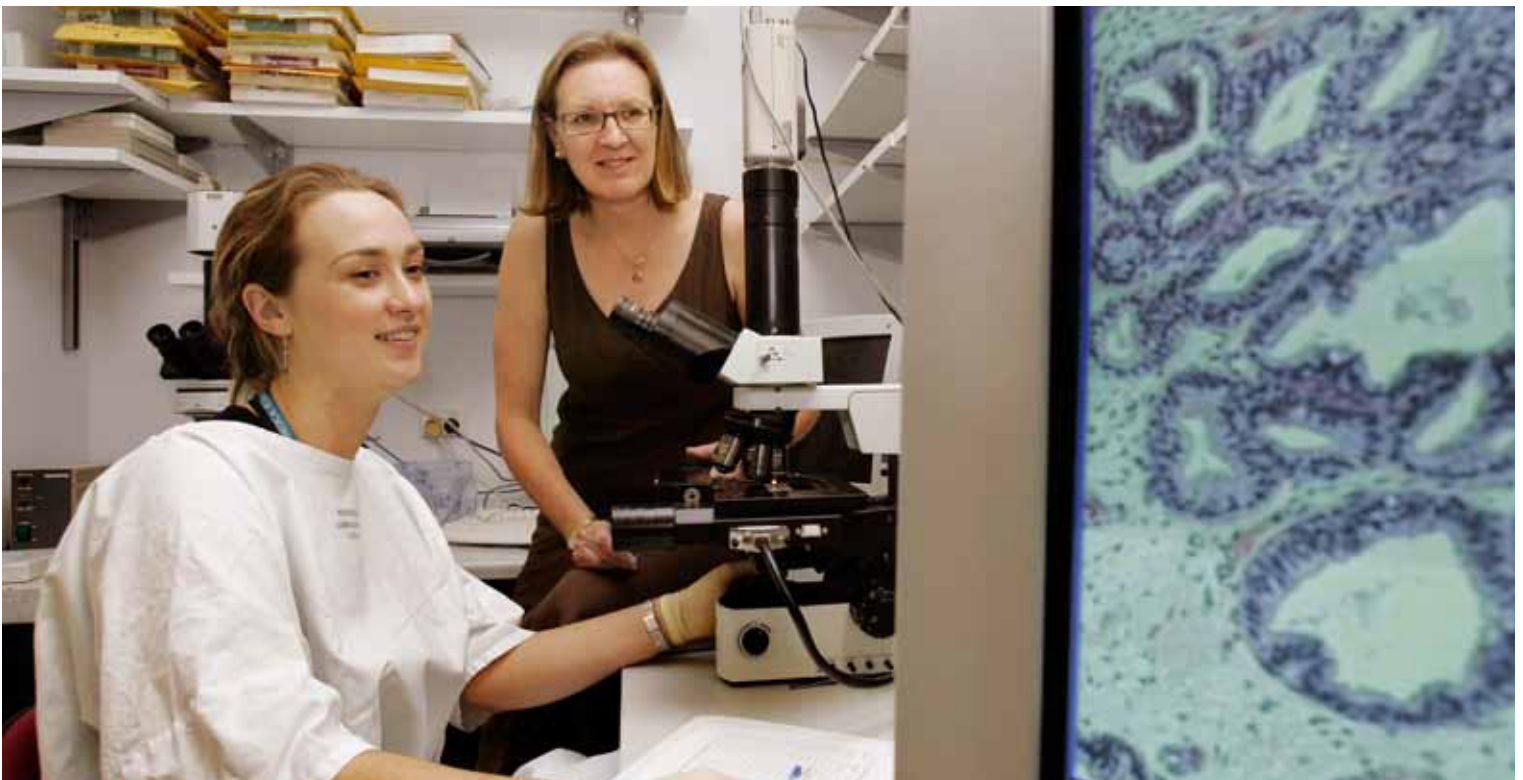
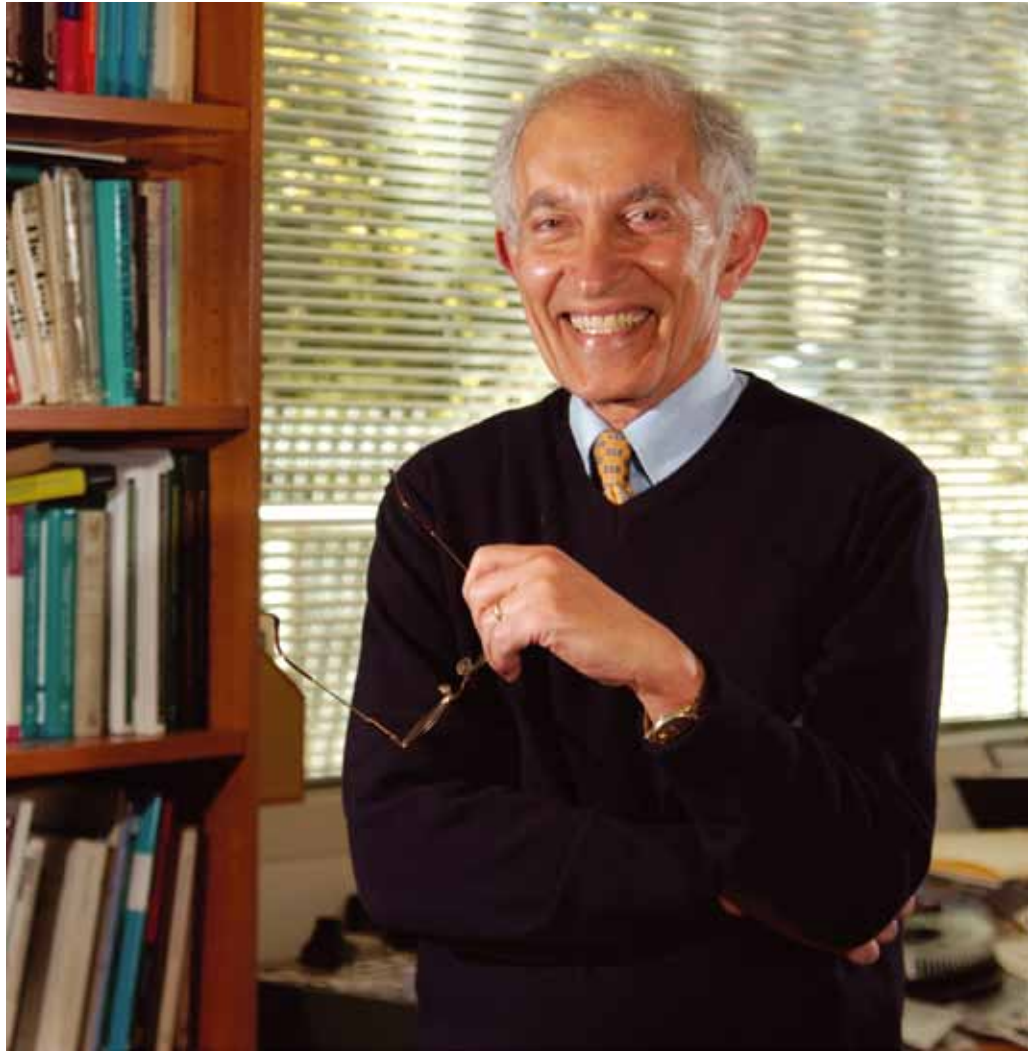
Professor Euan Wallace (Department of Obstetrics and Gynaecology) leads the Maternal-Fetal Medicine group, which has an international reputation for its research into recurring miscarriages, infections in pregnancy and pre-eclampsia.



Above: A cross-section of a mouse testis.

Right: Professor David de Kretser AC, now Governor of Victoria, is a Monash alumnus and has made a significant contribution to the field of male fertility.

Below: Professor Gail Risbridger with PhD student Prue Cowin.



Men's Health

The research area of men's health became prominent in the structure of the Faculty long ago when the Monash Institute of Reproduction and Development, now the Monash Institute of Medical Research, was founded by current Victorian Governor David de Kretser.

Monash Institute of Medical Research

Since renamed as the Monash Institute of Medical Research, the Institute is a key focus of men's health research in the Faculty, with an international reputation.

Research in Associate Professor Mark Hedger's laboratory investigates the unique interaction between male reproductive health and the immune system, with a view to treating autoimmune infertility conditions such as sperm antibodies, as well as chronic inflammatory pain syndromes. In 2008, Associate Professor Hedger was ranked as number six in the NHMRC publication *10 OF THE BEST*, which identifies the strongest grant recipients in Australia.

Associate Professor Kate Loveland is applying stem cell research to gain a better understanding of sperm production. The production of sperm in adults is critically dependent on a unique population of germ line stem cells and their supporting sertoli cells. These stem cells undergo a complex sequence of events to ensure the male gamete can carry its genetic cargo into the next generation. Associate Professor Loveland and her team focus on understanding how this cell population is established and what guides their maturation.

Professor Gail Risbridger and Professor Robert McLachlan head urology and andrology teams at the Monash Health Research Precinct. Both teams focus their efforts on research programs that provide better outcomes for benign prostate disease through research and better treatment options for men seeking hormonal based contraception.

Professor Gail Risbridger is also looking at how best to target the cancer initiating cells, or stem cells, when treating prostate cancer. Many therapies for prostate cancer directly target the tumour cells, but not the cancer initiating cells or stem cells. However, there is currently no way of reliably identifying the prostate stem cells. Professor Risbridger has proven the surrounding tissue or tumour stroma can drive and determine the cancer stem cell pathology, making the stroma another target for therapeutic development. She currently aims to determine how to target and manipulate the prostate stem cells directly.

Her research was the first in the world to use stem cells to grow human prostate tissue in the laboratory to investigate its transition from a healthy to a diseased state.

Assisting conception at the Monash Immunology and Stem Cell Laboratories

MISCL is home to a research group focusing on Stem Cell Therapies for Reproductive and Genetic Disorders. Deputy group leader Dr Orly Lacham-Kaplan pursues state-of-the-art technologies to overcome male infertility.

In 2001, she developed spermless conception – the ground-breaking ability to fertilise eggs without the use of sperm – which could assist men with no sperm or testicular cells to father children. Dr Lacham-Kaplan developed the procedure by using other cells from the body – somatic cells – to fertilise eggs. This method is still under scientific investigation and if successful may assist many spermless men to father children.

Her work also includes microinjection of suboptimal sperm, testicular sperm and testicular germ cells into oocytes to overcome the inability of sperm to fertilise the female's eggs, helping men who would otherwise not be able to father their own children. Her current research investigates the use of stem cells to produce sperm in culture.

Technology Platforms

Research Platform Director: Professor A Ian Smith

The Faculty of Medicine, Nursing and Health Sciences is committed to providing the best technology to researchers, as well as to Monash University, to our collaborating external academic colleagues and the biotechnology and pharma industries. Continuous investment in infrastructure, and in the skilled staff to operate it, will ensure that the capacity for users to access new technology is always available close by.

Access to the Faculty's state-of-the-art platforms merely requires the simple submission of a short proposal, which is then used to determine the services and level of assistance required for a specific research project. This streamlined process allows Faculty researchers easy and direct access to any facility or service or to a combination of them.

Below: Dean of the Faculty of Medicine, Nursing and Health Sciences, Professor Steve Wesselingh (left), with MATF Director Alan Sawyer.



Monoclonal Antibody Production (MATF)

The Monash Monoclonal Antibody Technology Facility (MATF) is one of the only high throughput production facilities in the world, offering custom-made, high affinity monoclonal antibodies. It has been established to provide a global source of reagents for researchers in academia and industry, and to continuously advance proteomics-level technology developments. MATF is an internationally accessible facility with the capacity to provide thousands of novel antibodies every year.

Biomedical Proteomics

The Monash Biomedical Proteomics Facility provides researchers at Monash and its affiliated institutes, as well as its academic and commercial collaborators, access to absolute state-of-the-art proteomic technologies including mass spectrometry, protein separation technologies (Gels, LC and others) for protein quantitation and identification. The Monash Biomedical Proteomics Facility also houses the Victorian node of Proteomics Australia, the recently established NCRIS funded network, which provides high quality proteomic capabilities to researchers throughout Australia.

FlowCore

FlowCore is a new, purpose-built flow cytometry facility, providing world-class flow cytometry services to scientists from Monash University, the Australian Stem Cell Centre and other academic and commercial collaborators. The large, purpose-built laboratory houses three high-speed sorters and three analysers, making FlowCore one of the top flow cytometry facilities in Australia. Importantly, FlowCore has four highly experienced full-time staff to operate the sorters, provide training and assistance for the analysers and help with experimental design. FlowCore also houses Australia's first five-laser cell sorter, allowing yet unseen flexibility for the researcher.

FishCore

FishCore is the most recent addition to the Faculty's bank of core technologies. This facility houses a zebrafish aquarium and was built at a cost of \$3.8 million. Once fully operational, the facility will contain 5,000 zebrafish tanks, a 1,000 tank quarantine room, and a self-contained phenotyping room (the former two at PC 2 levels).

Micromon

Established in 1985, Micromon is the commercial arm of the Microbiology Department within the School of Biomedical Sciences. With a solid service reputation, Micromon is a research-driven, self-sufficient platform that provides absolute state-of-the-art DNA sequencing technologies and Microbial services to Monash, local and international academic collaborators, and our local pharmaceutical and biotechnology industries.

Monash Micro Imaging (MMI)

Monash Micro Imaging is a microscopy and imaging research support facility located at Monash University. This particular facility is unique, as it operates on a 'hub and spoke' model, with nodes at the AMREP precinct and also at the Monash Medical Centre precinct. This ensures all Monash researchers have ready access to the facility's state-of-the-art optical imaging capabilities. The MMI staff provide consultation and access to the instrumentation, services and training, as well as having an involvement in collaborative research and project development.

High Throughput Protein Production

The protein production unit is the only facility in Australia that has the capability to express and purify large numbers of recombinant proteins for a variety of research purposes in a high throughput manner. The unit offers expertise in the optimisation of the protein expression systems, using a high throughput approach. The unit has extensive experience in the production of recombinant proteins from a variety of sources and has the ability to integrate this service with other platform technologies (for example, proteomics and high throughput crystallography) that are currently available at Monash University.

Monash Animal Services (MAS)

Monash Animal Services is committed to the provision of high quality laboratory animals and associated services. Through MAS, Faculty researchers have access to transgenic animal production, animal models, support for animal import and export, animal procurement and animal health and welfare

support. MAS also provides advice, training and guidance in all issues ranging from animal ethics through to animal-handling and training in animal procedures.

Clinical trials

The Faculty has considerable capabilities to design and undertake clinical trials in a range of disease areas including cancer, neurological disease and cardiovascular diseases. Through the School of Public Health and Preventative Medicine in particular, the Faculty can also offer world's best expertise in clinical informatics and data management.

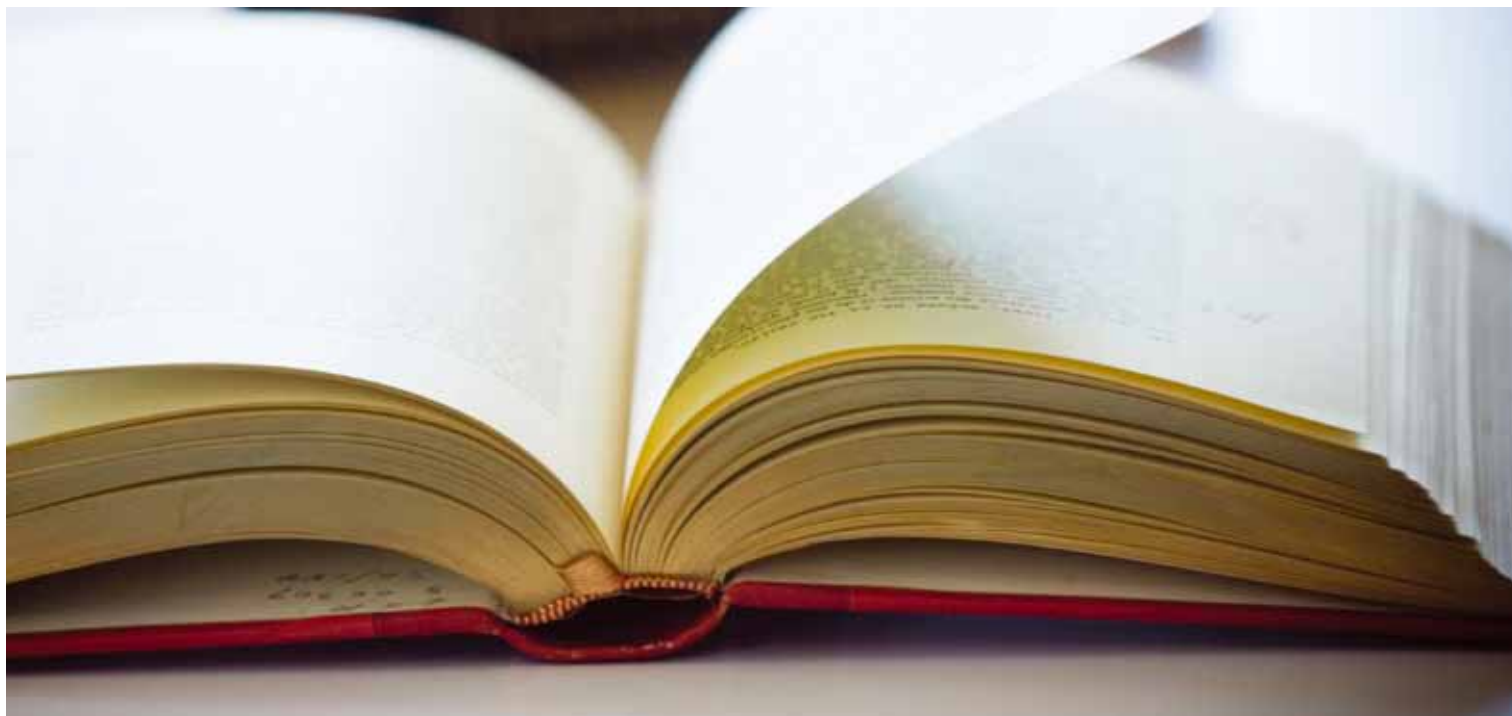
Other capabilities

There are a number of technology platforms currently under development, including High Throughput Crystallography (rapid robotic preparation and evaluation of protein crystals), and Monash Bioimaging (such as cell, tissue and whole animal imaging, Pet, MRI and Pet scanning). Finally, through strong collaborative links with the Monash Institute for Pharmacological Sciences (MIPS) we have access to the very best Australia has to offer in terms of drug discovery, drug lead optimisation and new and improved methods of drug delivery.

Below: Zebrafish are crucial to medical research at Monash University.



Number one for teaching and learning







Number one for teaching and learning

Introduction

The Faculty of Medicine, Nursing and Health Sciences is a centre of academic excellence, providing education of the highest quality to medical and health science practitioners, teachers and researchers of the future.

As the largest medical faculty in Australasia, and with a presence on campuses in Malaysia and South Africa, the Faculty is shaping the future of the health profession both nationally and internationally. The Faculty has successfully established itself as a high-quality provider of medical and health sciences education and this quality is reflected through:

- the rigorous standards required for admission to its courses
- the progression and retention rates of current students; and
- the reputation of its graduates in practice, research, academia, business and public life.

The Faculty is constantly extending the range of courses offered, developing relevant course content at both undergraduate and postgraduate levels in response to professional needs in our own region and overseas.

With the delivery of health science programs in rural and metropolitan Victoria – and in Malaysia – the Faculty is ideally placed to train graduates for a broad range of specific community needs.

Monash graduates contribute significantly to the challenges of providing healthcare, particularly in the demanding environment of rural and regional Australia, as well as in Malaysia.



Undergraduate courses

- Arts/Social Work
- Behavioural Neuroscience
- Biomedical Science
- Biomedical Science/Economics
- Biomedical Science/Engineering
- Biomedical Science/
Bachelor of Science
- Biomedical Science/Law
- Biotechnology (Hons)
– multi-Faculty
- Emergency Health (Paramedic)
- Health Sciences
- Health Sciences/Social Work
- Bachelor of Surgery/
Bachelor of Medicine (MBBS)
- MBBS graduate entry
- MBBS and MBBS/Law
- Midwifery
- Nursing
- Nursing/Midwifery
- Nursing Psychological Studies
- Nursing/Emergency Health
- Nursing/Rural Health Practice
- Nutrition and Dietetics
- Occupational Therapy
- Physiotherapy
- Psychology
- Psychology and Business
- Psychology with Honours
- Radiography and
Medical Imaging
- Social work
- Diploma of Psychology
- Diploma of Health Sciences



Bachelor of Surgery / Bachelor of Medicine (MBBS)

The Faculty's flagship course is the Bachelor of Medicine / Bachelor of Surgery (MBBS) course. These degrees are based at three different campuses: Clayton, Malaysia, and in Gippsland where the graduate entry program commenced in 2008.

Our medical curriculum provides students with a continually expanding level of medical experience, starting in the first semester of the course. In the early years, the basic medical sciences are taught in the context of their relevance to patient care. Later in the course, clinical teaching builds upon and reinforces this strong scientific foundation.

The Monash degree emphasises clinical communication skills and early clinical contact visits to medical practices, community care facilities and hospitals. All students spend significant time in rural areas as part of a healthcare team (read about the School's regional clinical schools on page 26-27).

Students also have the opportunity of studying for an extra year to complete the Bachelor of Medical Science (BMedSc) degree. During the 12-month period required for completion of the BMedSc, students undertake research activities supervised through a department of the Faculty and complete a minor thesis. They then graduate with both the MBBS and the BMedSc degrees after six years of study.

Postgraduate courses

The Faculty offers a comprehensive range of postgraduate courses including postgraduate certificates, diplomas, masters coursework programs and research degrees in health-related disciplines. These opportunities prepare graduates to enter the workforce as health professionals, world-class researchers, and to provide ongoing professional development.

- Biomedical Sciences
- Clinical Sciences
- Community Emergency Health
- Epidemiology and Preventive Medicine
- Evidence Based Practice
- Forensic Medicine
- General Practice
- Health Sciences
- Health Informatics
- Health Professional Education
- Immunology
- Medical Acupuncture
- Medical Imaging and Radiation Sciences
- Medicine
- Midwifery
- Nursing
- Obstetrics and Gynaecology
- Paediatrics
- Physiotherapy
- Psychology and Psychological Medicine
- Reproductive Sciences
- Rural Health
- Social Work
- Surgery



Postgraduate focus: Louisa Mathias, PhD student

In April last year, Louisa Mathias was excited about returning to life as a Monash student after a short period of time working as a research assistant.

“The reason why I wanted to do a PhD was because I was looking for a challenge and a project of my own to do, and that’s exactly what a PhD can offer,” says the Monash Bachelor of Science graduate and former research assistant.

Louisa now pursues her own research at the renowned Monash Immunology and Stem Cell Laboratories, where she works as part of Professor Richard Boyd’s immune reconstitution laboratory (read more about Professor Boyd on page 104). She is also the recipient of a prestigious Monash Graduate Scholarship.

Her work focuses on mesenchymal stem cells, a powerful type of cell responsible for dramatic recoveries in inflammatory conditions during clinical trials. Mesenchymal cells have been shown to reverse conditions such as

Graft-Versus-Host Disease, a vicious condition that attacks the body of bone-marrow transplant recipients.

But most research into mesenchymal cells has focused on cells taken from bone-marrow, which is painful and laborious to extract.

“I’m looking at isolating these cells from human fat and the umbilical cord, which are usually discarded tissues, and also look at the mesenchymal cells taken from bone-marrow to compare the anti-inflammatory abilities. My main aim is to compare the mesenchymal stem cells extracted from the different tissue sources and to figure out which source is best,” says Louisa.

The work may shed light on an alternative therapeutic for multiple sclerosis.

Set to finish her PhD in 2010, Louisa does not look back at her decision to return to study, and is considering a long-term career in research.

“I really love my project. It gives me a bit of a headache sometimes, but I like the challenge.”

Going global

The Faculty of Medicine, Nursing and Health Sciences is a fundamental contributor to the reputation and positioning of Monash as a truly international university.

Our relationships with collaborators and partner universities worldwide provide a framework for our research in areas such as global health, and further our goal of inculcating values of equity and egalitarianism into our students.

Beyond our unique capability to provide offshore education at our own landmark campuses of Sunway Malaysia and Monash South Africa, we provide teaching expertise at a number of offshore locations and with key teaching partners around the world.

United Arab Emirates

The Faculty nurtures strong links with the United Arab Emirates.

In addition to licensing our MBBS curriculum to the University of Sharjah, we also host many UAE students in our Diploma of Health Sciences, which is designed as a seamless pathway into the undergraduate degrees and disciplines of the Faculty.

Indonesia

Since midway through 2008, the Faculty has hosted medical students from the Universitas Indonesia, a prominent university which has played a key role in directing the educational priorities of Indonesia since its establishment more than 60 years ago.

The medical students travel to Victoria to complete the year-long Bachelor of Medical Science program. The cohort will continue to grow each year.

Singapore

Singapore is one of the Faculty's strongest international playing fields, with 354 alumni on the ground.

Monash has a long-standing relationship with the cutting-edge Republic Polytechnic (RP) in Singapore.

Students from the Advanced Diploma of Biomedical Science program at RP can choose to enter the third year of the Bachelor of Biomedical Sciences at Clayton. Many of them continue with research or coursework degrees within the Faculty's many departments and institutes.

International profile

Kartini Asari entered the third year of the Bachelor of Biomedical Science degree in February 2007 after completing the Advanced Diploma of Biomedical Science at Republic Polytechnic (RP) in Singapore. She is now studying her Graduate Diploma in Reproductive Sciences with the Prince Henry's Institute and the Monash Institute of Medical Research (MIMR).

"I came here together with a group of nine friends", says Kartini. "Because we were in a new place and living on our own and had each other, we decided to explore Melbourne together. In the first few weeks we went to the Moomba festival and the city and made lots of new friends from Monash Uni. We took lots of photos and posted them up on Facebook, and everyone in Singapore asked: 'Did you guys go for a holiday? You're having so much fun!'

"At RP we study using the problem-based learning method, and that includes presentations and group lectures every day.



“Monash is more classical. This was a little bit of a challenge at the start, but then we were able to cope. Because we had one another for support it was much better.

“I wasn’t sure which way I wanted to go [after my studies]. I stumbled onto this thing called the Education Program in Reproduction and Development after chatting with some lecturers and demonstrators in my Anatomy class. I realised that I really want to embark on the developmental side of biology.

“Lately I’ve been learning a lot about reproductive science and it’s pretty interesting to know how nature actually develops and how something that seems so simple can actually be so complicated.

“I had a mini research project with Prince Henry’s – a two-week attachment. I learnt a lot within two weeks so I was really happy. So many different techniques and the staff were really approachable.

“I really hope to embark on a career in research because I’m interested in discovering new things. I’m hoping to find areas I’d like to specialise in, and to do a research component.”

Our teaching

Dr Jane Tracy

In 2006, Dr Jane Tracy won the prestigious Vice-Chancellor's Award for Teaching Excellence. Over the years, the Education Director of the Centre for Developmental Disability Health Victoria (CDDHV) has also received a Faculty teaching award and an Australian Carrick Award for University Teaching (Citation for Outstanding Contribution to Student Learning).

Over the last 16 years, Dr Tracy has worked with her colleagues to develop and implement a curriculum in the area of developmental disability health for Victorian medical schools.

In the past, doctors received little training in this area and often expressed a lack of knowledge and confidence when working with patients with disabilities including intellectual disability, autism and cerebral palsy. Thanks to Dr Tracy and her colleagues, Victorian medical students now receive opportunities throughout their course to develop the attitudes, skills and knowledge required to provide high-quality healthcare to such patients.

Dr Tracy contributed to *Management Guidelines: Developmental Disability (2005)*, the first Australian textbook on Developmental Disability, and worked with colleague Dr Mary Burbidge and other CDDHV staff to produce *Healthcare Scenarios in Developmental Disability Medicine (2005)*, an interactive, multimedia teaching resource for students and practitioners in medicine. Both resources are now used as primary resources for medical teaching in this area.

Over the last two years, Dr Tracy has led a multidisciplinary team from the School of Primary Health Care (including staff from Dietetics, Medicine, Nursing, Emergency Health/ Paramedic Practice, Physiotherapy, Occupational Therapy, Health Science and Social Work, Education design and e-learning, as well as students within the Faculty), collaborated with disability professionals and special-needs dentists to build a web-based teaching and learning package for students from all disciplines – 'Health and Disability: Partnerships in Action'. It provides a rich learning environment, built around the

experiences of people with disabilities, helping students to gain an understanding of the healthcare issues of this group.

Dr Tracy believes that through focusing on ways to better meet the health needs of people with developmental disabilities, students also acquire more general skills, building their capacity to work with other patient groups who have chronic complex healthcare issues.

She has a personal commitment to developmental disability health; 23 years ago, her son, Nick, was identified as having multiple disabilities, and it was through her experiences with both Nick and her daughter Emma that she was drawn to work in this area of medicine.



Associate Professor Ramesh Rajan

A highly regarded and popular teacher and researcher in the Department of Physiology in the School of Biomedical Sciences, Associate Professor Ramesh Rajan has received a Vice-Chancellor's Award for Teaching Excellence, and received a Carrick Citation for Outstanding Contributions to Student Learning.

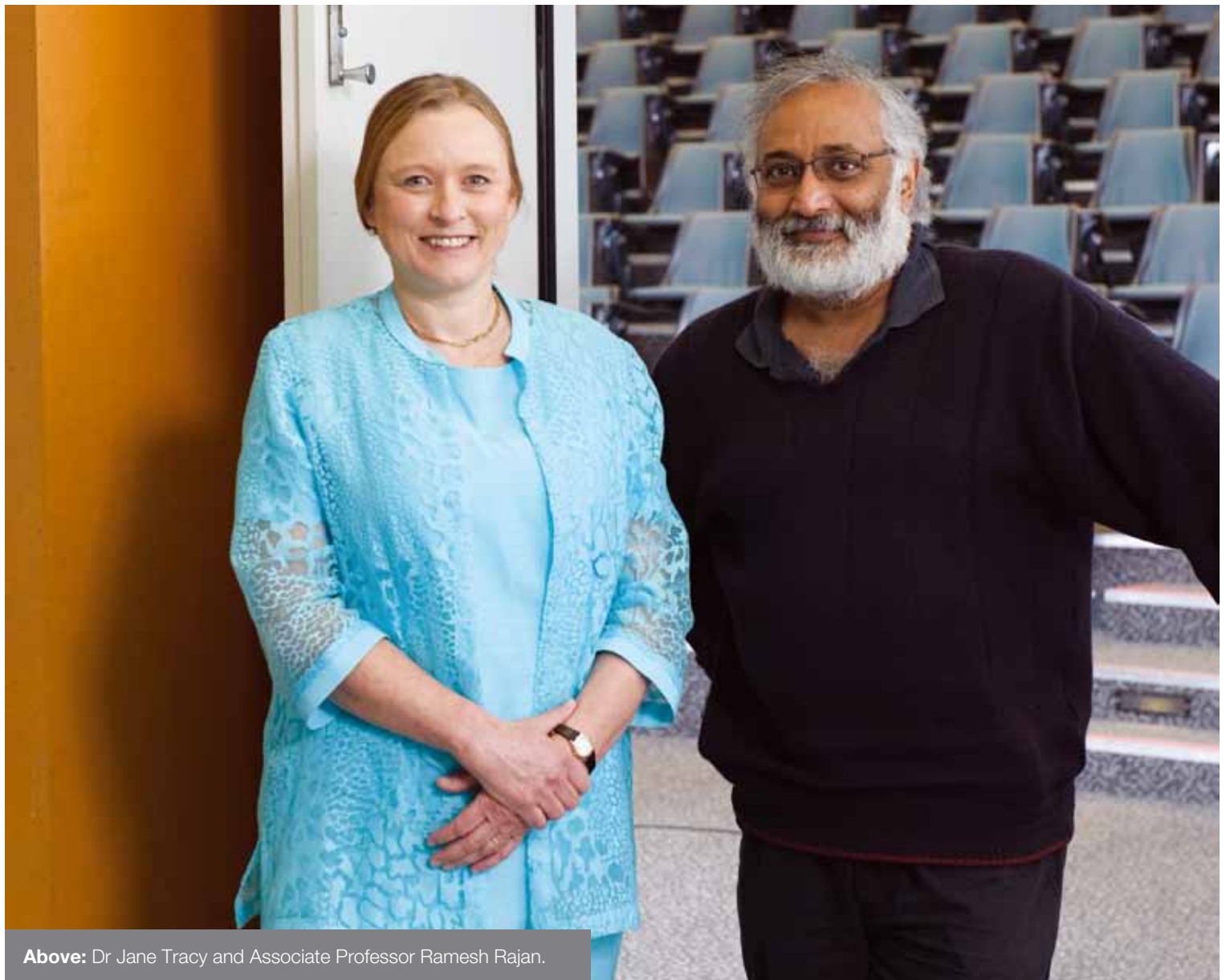
He teaches neurosciences in courses including the Bachelor of Science, the Bachelor of Biomedical Science, the Bachelor of Behavioural Neuroscience and the Bachelor of Medicine/ Bachelor of Surgery.

He enjoys the positive and fun interactions with students, as well as the opportunity to enthuse them about learning generally, whether in his discipline area or otherwise.

Associate Professor Rajan supervises two PhD students and two Honours students. His research concentrates on two main topics in neuroscience research: how the brain allows us to perceive the world around us through our sensory systems; and how we learn and improve in the skill of understanding speech when there is noise in the background.

He investigates the first topic by recording the responses of nerve cells in the brain and varying the types of stimuli that are presented, then examining how these stimuli are signaled (encoded) by the nerve cells.

The second topic has relevance to conditions such as ageing, where older people have difficulty understanding what is said to them against background noise; auditory processing disorders (when children have difficulty in noisy class rooms), and dyslexia, as well as for people for whom the speech is in their second language.



Above: Dr Jane Tracy and Associate Professor Ramesh Rajan.

Our programs in equity

The Faculty of Medicine, Nursing and Health Sciences does more than simply convey the importance of equity and egalitarianism in strategic statements.

We inculcate the values of equity and respect for others into our students, and through the culture of our staff.

As an international university, we not only respect diversity, we seek to understand issues from a global perspective. And as practitioners and researchers in the healthcare sector, we promote the use of that expertise to make a difference to the greatest number of people, wherever in the world they come from, or wherever they live.

Indigenous trainees

Supporting the advancement of Australia's Indigenous people is at the core of the culture of promoting equity and diversity within the Faculty. Within the framework provided by the Monash Indigenous Employment Policy, we seek to address the imbalance in health education between our Indigenous people and the wider community.

Participation in Indigenous traineeships provides disadvantaged students with academic pathways and heightened future employment prospects. This initiative recognises the difficulties encountered by Indigenous students in relocating from a remote community to undertake study at Monash campuses, and seeks to maintain a high level of engagement between the Faculty and remote communities.

The proximity of our Gippsland campus is a key aspect of developing and enhancing our relationships with many Indigenous communities.

Indigenous traineeships also fulfil an important function in providing a base of Monash-ready employees, and in ensuring that the University continues to be regarded as an employer of choice across diverse elements of the community.

Medicine, Nursing and Health Sciences Scholars Bursary

The Faculty's new Medicine, Nursing and Health Sciences Scholars Bursary offers a hand up to bright students in need. It recognises that the Faculty has a global reach in a world filled with more displaced people and harrowing tales of survival than ever before.

"We need to educate and nurture future leaders who can make a real difference from within their communities. These are young people who deserve a chance to realise their potential. They are intelligent, driven, and committed to their dreams of helping others, despite surviving enormous personal adversity," says Professor Steve Wesselingh, Dean of the Faculty of Medicine, Nursing and Health Sciences.

The bursary supports students from all backgrounds, whether they arrive from less-developed countries, live in our community as refugees, struggle with problems that strike rural areas, or grow up in Australia's remote Indigenous communities.

Requests for assistance from domestic students mention poverty, chronic illness and bereavement, to name just a few issues they face. The pool of students supported by the Faculty's bursaries include AIDS orphan Kevin Sumba, along with a Kurdish refugee, a former political prisoner, and many Australian students.



Kevin Sumba

Kevin Sumba is the most prominent student receiving the support of the Bursary. When film director Miles Roston first met Kevin, the 12-year-old lived alone in the slums of the Kenyan city Kisumu, roasting and selling peanuts for survival, and sneaking into school because he couldn't afford the fees.

Roston's subsequent book and film, *Kevin's Questions*, captured the world's attention with its story of an AIDS orphan who dreamed of life as a doctor. Trips around the world to raise awareness of the devastation of AIDS

followed, and it was during one of these trips that Kevin and the award-winning film director met the future Dean of the Faculty of Medicine, Nursing and Health Sciences, Professor Steve Wesselingh.

Eight years later, Kevin now studies Health Sciences at the Monash Peninsula campus, supported by the Faculty and a handful of generous donors, working towards his dream of studying medicine. His course fees, housing, books and computer, as well as legal costs associated with migration, are met by the Faculty's new Medicine, Nursing and Health Sciences Scholars Bursary. The transformation to Kevin's life and the opportunities that await him clearly demonstrate the power of change that such a bursary can provide.

Our alumni





Our alumni

The Faculty's alumni community of over 19,000 reaches all continents, including Antarctica, where alumnus Dr Tony Stewart (MBBS 1981) regularly serves as medical officer at Douglas Mawson's Hut.

The history of our alumni dates back to the earliest MBBS cohorts in the 1960s, when Professor John Murtagh AM (MBBS 1966, MD 1989) was learning the medical foundations that would one day contribute to *Murtagh's General Practice*, which is published in 11 languages and is the biggest selling text in the global primary healthcare field.

Although relatively new to their careers, which include medicine, physiotherapy, nursing and biomedical research, our younger

alumni apply the same standards of excellence to push the boundaries of their chosen fields.

The Faculty's first PhD graduate from the Department of Physiotherapy, Dr Natalie de Morton (PhD 2007), has produced a diagnostic test for clinicians to assess the mobility of older patients. Many health services in Australia and overseas already apply her work, two Australian universities teach it in their curriculum, and European collaborators will soon translate it into Dutch and German.



Below: Dr Natalie de Morton, Monash University's first PhD recipient in Physiotherapy.

Alumni profile

Dr Susan Lim

(MBBS (Hons) 1979)

Susan Lim established her reputation as a surgeon in 1990 after performing Singapore's first successful liver transplant. The operation was also a first for South-East Asia.

Born in Singapore, Dr Lim came to Monash on a Colombo Plan scholarship in 1974.

While at Monash, she won the David Rosenthal Memorial Prize (shared) for the highest aggregate marks in the first three pre-clinical years at Monash, before graduating with first class honours in 1979.

In 1984, Dr Lim became a Fellow of the Royal College of Surgeons of Edinburgh and received the G B Ong Gold Medal for the most outstanding candidate in General Surgery. The following year, Dr Lim was awarded a Sir Winston Churchill Scholarship to pursue a doctorate in Transplantation Immunology at the University of Cambridge. She completed her PhD in 1988 and returned to Singapore in 1989.

After leaving the National University of Singapore in 1995, Dr Lim went into private practice, focusing on transplantation, breast cancer, minimal access and robotic surgery.

In 2000, the Singapore community presented her with the 'Spirit of the Century' award in recognition of personal excellence and her global achievements. She also had her hands immortalised at Madame Tussauds' Exhibition.

In 2003, Dr Lim launched Stem Cell Technologies a biotech company to research the use of adult stem cells for application in cell therapy and regenerative medicine. In 2004, the company entered into research collaboration with the National University of Singapore to specifically research the use of adult stem cells as a potential cure for diabetes.

She successfully pioneered the Robotic (Da Vinci) General Surgical program for Singapore in 2004. Dr Lim continues to lead in the field of academic research.

In October 2004, she became a Fellow of the American College of Surgeons, and in May 2005, she was conferred the honour of Fellow of Trinity College, becoming the youngest Fellow to receive this honour. She was also a recipient of the 2005 Monash University Distinguished Alumni Award.

In 2008, the American Academy of Continuing Medical Education named its 28th Award 'The Dr Susan Lim Award' in honour of Dr Lim's extraordinary career, contribution and international achievements.

Outside of medical practice, Dr Lim is a volunteer captain in the Singapore Armed Forces. She is also actively involved in charity and jointly-established with her husband, the Indiapore Trust to raise money to fund e-learning and children's education in the field of information technology.

Below: Dr Susan Lim



Alumni profile

Professor Dato' Dr Khalid Abdul Kadir

Head of the Clinical School, Johor Bahru
(BMedSci (Hons) 1973, MBBS (Hons) 1975,
PhD 1984)

In August 2008, Professor Dato' Dr Khalid Kadir was named a co-recipient of Malaysia's prestigious Merdeka Award for Health, Science and Technology. Dr Khalid was recognised for his research into diabetes and the relationship between hormones and stresses in various tissues.

Professor Dato' Khalid was born in Johor and went to school at the Royal Military College. His brilliant academic record culminated in him winning the prestigious Commandant's Prize in 1968.

He won a scholarship to study medicine at Monash, where he scored double first-class honours in the Bachelor of Medical Science in 1973, and first class honours in the Bachelor of Medicine / Bachelor of Surgery in 1975. He also won the Henry Hindlip Green Prize in Clinical Medicine and the Harriet Power Prize in Medicine.

He worked at The Alfred hospital and Prince Henry's Hospital in Melbourne, where he trained in endocrinology, becoming a Fellow of the Royal Australian College of Physicians in 1984.

Professor Dato' Khalid won a Monash University Postgraduate Scholarship, and was awarded a PhD in 1984.

In 1992, he was elevated to Fellowship of the Royal College of Physicians in Edinburgh, Glasgow and Ireland, and was made a Fellow of the Royal College of Pathologists of Australasia in Chemical Pathology. In 1995, he was elected Fellow of the Academy of Sciences (Malaysia), and in 1997 he was awarded Fellowship of the Royal College of Physicians.

He returned to Malaysia in 1982 to join Universiti Kebangsaan Malaysia (UKM) as a lecturer. He was promoted to Associate Professor in 1984 and Head of the Department of Medicine in 1985. He was promoted to Professor and became Dean of the Medical Faculty in 1990.

In 1997, he resigned to become Director of the new Hospital UKM, a role he held until September 2000 when he stepped down to concentrate on clinical medicine and research. He retired from UKM in 2004 and was awarded the title of Emeritus Professor of the University.

In September 2004, he was appointed Professor of Medicine for Monash University Malaysia.

Professor Dato' Khalid's main research interests are in stress and the mechanisms of adaptation to stress by hormones, as well as in the clinical epidemiology of diabetes. He has published more than 270 scientific articles in international and local journals and chapters in four international textbooks on endocrinology and diabetes. He has supervised many PhD and Masters students and is on the editorial board of several international journals.

He was awarded the Tun Abdul Razak Research Award in 1986, the Asia Pacific Society Clinical Nutrition Award in 1996, and the National Science Award in 1997. He has received invitations to speak at many conferences, including numerous meetings of the International Diabetes Federation Congress.

In 1992, he was elected President of the ASEAN Federation of Endocrine Societies, and in 2000 he was elected as Member of Council, International Diabetes Federation, representing Western Pacific countries.

Professor Dato' Khalid was an elected member of the Malaysia Medical Council from 1986 til 2001, President of Persatuan Diabetes Malaysia (Malaysian Diabetes Association) for five years until 1990, and the President of the Malaysian Endocrine Society between 1995 and 1998, and again in 2001. He is presently the Vice Master of The Academy of Medicine of Malaysia.

Below: Professor Dato' Dr Khalid Abdul Kadir



Alumni profile

Professor Richard Boyd

(BSc (Hons) 1973, PhD 1977)

Director of the Monash Immunology and Stem Cell Laboratories

“There’s a lot of serendipity in science,” says Professor Boyd.

The renowned immunologist first stepped onto Monash turf when he signed up for a Bachelor of Science in 1969. He graduated three years later with majors in Biochemistry and Genetics.

Soon after graduating, he showed up to an interview with a prospective Honours supervisor at The Alfred while dressed in board-shorts and thongs, and with long hair. Despite the young surfer’s unconventional dress, Professor Richard Nairn, the Foundation Professor of Pathology (later ‘Pathology and Immunology’ and more recently ‘Immunology’) took him on as a student. He was one of the first three students in Australia to take Immunology as a subject in his Bachelor of Science course.

“It was a lucky, career-changing break for me, especially fortuitous because I had otherwise been conscripted to go to Vietnam,” says Professor Boyd.

Halfway through his PhD, he helped establish a third-year undergraduate teaching program in immunology. It proved so popular with science students that the young Boyd began lecturing in the subject before completing his doctorate. Its reputation now means that “an amazing number of top immunologists in Australia and around the world were originally Monash-trained or were direct collaborators”.

Professor Boyd studies the thymus – the organ solely responsible for generating immune protection, but which severely atrophies with age. Among various projects, his team researches the possibility for its reactivation in cancer patients receiving chemotherapy. They also use the anti-inflammatory properties of mesenchymal stem cells (MSCs) (which also have the remarkable capacity to make bone, fat, muscle and cartilage) and amnion stem cells, which make many other cells in the body, to promote tissue repair.

He feels strongly about one of MISCL’s current projects – the establishment of stem cell banks and a stem cell delivery system.

“We want to be in a position where we can deliver stem cells safely to the doctors, who can then deliver them to their patients, through a process which must continue to be highly-regulated so that we only give patients stem cell therapies when appropriate, approved and safe,” he says.

“The newborn baby has a wealth of stem cells which we should store as a potential body repair kit for the future – such as cord blood, cord MSC and amnion stem cells. Yet only about 1 per cent of babies have such valuable cells reserved. We need to change this immediately to improve our healthcare in the future,” he says.

The recipient of several prestigious awards, and Director of the Monash node of prestigious Australia-China Centre for Excellence in Stem Cell Research, together with the University of Peking, Professor Boyd’s career is almost inextricably linked to Monash.

“The only time I left Monash was when I was awarded a five-year post-doctoral fellowship at Innsbruck in Austria. This was an important part of my training; it ‘internationalised’ me... The reason I returned to Australia was probably due more to serendipity again than good management. I was awarded a Commemorative Fellowship, which brought me back to the energy of the immunology course. It’s been a buzz ever since.”

Below: Professor Richard Boyd



Alumni profile

Dr Sid O'Toole (MBBS 2001) RAAF

After graduating with a Bachelor of Medicine / Bachelor of Surgery in 2001, Dr Sid O'Toole completed his intern year at Geelong Hospital in Victoria, and then stayed on as Registrar for another year. As he had studied on a bonded Australian Defence Force scholarship, in 2004 he commenced his required Return of Service Obligation at the Royal Australian Airforce (RAAF) Officer Training School.

While an undergraduate student, Dr O'Toole held the rank of Officer Cadet in the RAAF. Following graduation, he received his commission as Flight Lieutenant.

"After Officer Training School I was posted to RAAF Tindal, in the Northern Territory. There my responsibilities included health support to the members of 322 Combat Support Squadron, and 75 Squadron, an F/A-18 Fighter Squadron. We also took on the role of civilian search and rescue, utilising the Search and Rescue Helicopter from the RAAF Base," Dr O'Toole says.

Over the next few years, Dr O'Toole's deployments took him outside Australia to East Timor and the Middle East. He has vivid memories in 2007 of being 'sideways tasked' from duties in Timor and attending to victims of the Garuda Airlines disaster, where a Boeing 737-400 burst into flames on landing at Yogyakarta Airport in Java, killing 22 people.

"We had been warned to expect an unknown number of injured people, so took four aeromedical evacuation teams, with specialist doctors and extra staff to set up an Aeromedical Staging Facility to triage and hold patients in preparation for transport," he says.

While in the Middle East Area of Operations, Dr O'Toole worked at a large USAF base where the medical facilities were particularly good. From this base aeromedical evacuation team missions were mounted to Afghanistan or Iraq.

As an outgoing person, Dr O'Toole found little difficulty in adjusting to life far away from home.

"Medicine is the same everywhere you go. People get sick for the same reasons and the body generally responds in the same way. What is different are the resources available to deal with these problems," he says.

While still an undergraduate, Dr O'Toole planned to eventually practise medicine in a rural area. By mid-2009 his obligation to the RAAF will be fulfilled.

He will continue to have a commitment to spend time each year as a RAAF Reservist, but if things go according to plan, he and wife Kobi, a nurse, will soon be available to provide their valuable expertise to patients in rural Australia.

Dr O'Toole is now Squadron Leader and has taken up the position of Senior Medical Officer at RAAF Amberley Air Force Base, near Brisbane.



Above: Dr Sid O'Toole on deployment.

Alumni profile

Dr Geraldine Buckingham (MBBS (Hons) 2002) Rhodes Scholar

Dr Geraldine Buckingham graduated with an MBBS (Hons) in December 2002 and went on to an internship at St Vincent's Hospital in Melbourne. On the same day that she completed her medical studies, Dr Buckingham was awarded the Victorian Rhodes Scholarship. She deferred taking up her position at Oxford University and worked in the Victorian hospital system for 18 months before leaving for the UK.

While in Oxford, Dr Buckingham read for an MPhil in Comparative Social Policy. The course examined systems of social provision from around the world, but she focused on health policy. Her major research project closely examined the financial collapse of United Medical Protection in 2002, and critically assessed the subsequent medical indemnity reforms undertaken by the Federal Government.

Throughout her time at Oxford, Dr Buckingham continued to practise medicine, working as a Registrar in the Emergency Department at the John Radcliffe Hospital.

"It was great to be able to continue to work as a doctor in Oxford. For many students, Oxford is only about the

university. Working at the JR gave me an opportunity to understand the true breadth of the city," she says.

Dr Buckingham spent the summer in between her two years at Oxford undertaking an internship at the World Health Organisation (WHO) in Geneva. During this time, she worked with the International Policy Unit and focused primarily on building health systems in sub-Saharan Africa.

The combination of her study in Oxford, her time at the WHO and her long-standing interest in the policy and political issues surrounding healthcare, have ultimately led her away from clinical medicine. She now works in New York for the international consulting firm, McKinsey and Company.

"My work at McKinsey has focused on the emerging public-private partnership trend in Europe and the US, particularly in the areas of healthcare and retirement funding. I have learned an enormous amount about the complex issues involved in government provision of services and have been able to use some of my medical training to address wider social issues," she says.

Dr Buckingham is unsure where she will find herself professionally in the future.

"I would never have expected to be doing what I am now. Although I am no longer explicitly working as a doctor, I feel like I am using a lot of the skills I developed in medical school. I am confident that my medical experience and knowledge will help me to help address health issues in our community more broadly."



Above: Dr Geraldine Buckingham

Real outcomes: commercialisation and industry engagement



One of the major aims of the Faculty of Medicine, Nursing and Health Sciences is to engage in innovative research that, generates ideas and connects it with industry, government, and the community.

The foundation of our Faculty's technology transfer and commercialisation activities resides with the calibre and international standing of our researchers. Together with the strong support of the Faculty, an environment that encourages innovation and activities based around translational research is fostered at Monash.

Commercialisation

Our researchers have strong links with many of the top pharmaceutical and biotech companies in the world, including:

- Pfizer
- Roche
- AstraZeneca
- Novartis
- Schering
- Bristol-Myers Squibb; and
- Merck

The Faculty also contributes to therapeutic, diagnostic and medical device development through spin-out companies such as:

- Acrux Ltd
- Cortical Pty Ltd
- CNS Bio Pty Ltd
- Dia-B Tech Ltd
- ES Cell International Pte Ltd
- Maccine Pty Ltd
- Metabolic Pharmaceuticals Ltd
- Nephrogenix Pty Ltd; and
- VacTx

As at 25 September 2008, our research contracts amounted to more than \$14.6 million. Major contracts included:

- \$1,118,638 awarded to Dr Tracey Brown of the School of Biomedical Sciences by Alchemia Oncology for the development of a drug that targets colon cancer.
- \$1,204,873 awarded to Associate Professor Jennifer Wilkinson-Berka from the Department of Immunology at the Central Clinical School from BioDiem Ltd.
- \$872,235 awarded to Professor John McNeil and Dr Louise Phillips by the Australian Red Cross Society to collect data on outcomes of blood transfusions.
- \$637,340 awarded to Professor Malcolm Sim, an occupational physician and researcher at the School of Public Health and Preventive Medicine, and Dr Deborah Glass, by the Australian Institute of Petroleum Ltd.



Success stories

Monash IVF

In December 2007, the Faculty participated in one of the most successful cases of commercialisation from intellectual property developed in an Australian university.

It resulted from the sale of its stake in the internationally recognised in vitro fertilization (IVF) program at Monash IVF to ABN Amro Capital, a private equity offshoot of the global investment bank. The sale fetched just over \$200 million, of which Monash received just over half.

Monash IVF is responsible for the conception and birth of more than 20,000 babies since the late 1970s. Nine of the world's first 10 IVF babies were conceived at Monash IVF, which has laboratories and clinics in Victoria, NSW and Queensland, as well as in New Zealand, Sri Lanka and China.

Footrot vaccine

A vaccine under development in the Faculty's Department of Microbiology, in collaboration with Australian Wool Innovation Limited, aims to tackle one of the scourges of farming. Sheep footrot is a previously drug-resistant bacterial infection which causes lameness in sheep, resulting in significant production losses and animal welfare concerns.

Monash Institute of Medical Research (MIMR)

MIMR has a history of research excellence and commercial entrepreneurship. The Institute has been the source of seven of the University's start-up companies to date. 2007 saw the Institute generate over \$5.5 million from commercial activities including research contracts, licences and royalties. MIMR has strong links with Roche, AstraZeneca, Novartis, Vegenics and CNS Bio Pty Ltd.





Monash Immunology and Stem Cell Laboratories

The Monash Immunology and Stem Cell Laboratories (MISCL) aim to lead international stem cell research and therapeutic applications, combining this work with extensive research into immunology.

Among its commercial activities, MISCL has strong links with Norwood Immunology, a biotech company that focuses on therapies that impact on the immune system. It has two broad-based platforms, and the Immunology platform is based on more than twenty years of research led by Professor Richard Boyd and his team at MISCL.

Commercialisation spotlight: Monash and Mesoblast

Professor Graham Jenkin and neurosurgical registrar Dr Tony Goldschlager, together with Melbourne-based biotechnology company Mesoblast Limited, have pioneered a new treatment for spinal neck pain and injury using a unique population of adult stem cells.

In preclinical trials, the treatment has significantly increased the success rate and shortened recovery times of neck spinal fusion surgery.

Surgical fusion of the neck region of the spine accounts for up to 40 per cent of all spinal fusion procedures. Demand for the surgery is growing, with annual procedures expected to reach half a million in the United States alone within the next two years.

Under a sponsored research agreement between Monash University and Mesoblast, the proprietary stem cells were placed into a cage-like structure and surgically implanted between vertebrae in place of damaged discs to fuse or connect the two vertebrae.

