The Central and Eastern Clinical School was formally established in January 2001 as a result of restructuring in Monash University’s Faculty of Medicine Nursing and Health Sciences. The School operates in conjunction with all other Schools of the Faculty in the provision of its academic programs. It is responsible for the provision of teaching in all undergraduate courses of the Faculty, particularly the last three years of the medical curriculum. The School also provides teaching in a variety of postgraduate diploma and degree programs by coursework and honours programs for the degrees of Bachelor of Science and Bachelor of Biomedical Science. In addition there are over 120 postgraduate research students (mostly PhD students) working in the many research programs of the School and affiliated institutes.

Departments of the Faculty of Medicine, Nursing and Health Sciences which comprise the school are:

- Department of Epidemiology & Preventive Medicine 5
- Department of Forensic Medicine 21
- Department of Medicine at The Alfred Hospital 29
- Department of Medicine at Box Hill Hospital 42
- Department of Pathology & Immunology 50
- Department of Surgery at The Alfred 62
- Clinical School at The Alfred 69
The School is principally centred at The Alfred and Box Hill Hospitals but has academic presence in other teaching hospitals in Melbourne, namely Caulfield General Medical Centre, Maroondah Hospital, William Angliss Hospital and St Francis Xavier Cabrini Private Hospital. The Department of Forensic Medicine is located within the Victorian Institute of Forensic Medicine in South Melbourne. The hospitals provide resources in the form of patients and teachers for the School’s undergraduate medical teaching programs. Members of the academic staff of the School contribute to the clinical services and administrative processes of the affiliated hospitals, often in leadership positions. The undergraduate MBBS program could not be provided were it not for the honorary teaching contributions from the staff of the affiliated hospitals. This interaction facilitates the provision of high quality clinical care and postgraduate clinical training within the hospitals and also provides clinical experience and teaching for the students and research programs of the School.

The School also has a close affiliation with the Baker Medical Research Institute and the MacFarlane Burnet Institute for Medical Research and Public Health.

The year 2002 began with the move of the laboratories of the Departments of Medicine, Surgery, and Pathology and Immunology to the new purpose built facilities at the Alfred Medical Research and Education Precinct (AMREP). The Baker and Burnet Institutes have also relocated to this precinct along with a number of biotechnology companies including Cytopia and Starphama. AMREP is part of Victorian Premier Steve Bracks’ vision for the State to become one of the top five biotechnology locations worldwide by 2010.
Jeffrey Rosenfeld, Professor of Neurosurgery in the Department of Surgery at The Alfred was voted Victorian of the Year 2002. Students from the Department of Pathology and Immunology demonstrated outstanding achievements in 2002: Mr Jared Purton received a Victorian Premier’s commendation for Medical Research, and Mr Jason Gill had a first author paper published in Nature Immunology, and has been awarded a C.J. Martin Scholarship. Ms Rula Azzam received the Burnet Prize for Infectious Diseases. The Department of Medicine’s Ms Fiona See received the Baker’s prize for Basic Scientific Cardiovascular Research, Mr Darren Mansfield received the Michael J Hall Prize in Respiratory Medicine/Physiology/Lung Transplantation and Dr Kylie O’Brien received a Faculty Postgraduate Excellence Award. Students from the Departments of Epidemiology and Preventive Medicine and from the Department of Medicine were highly successful in obtaining NHMRC, NHF and Alfred Research Fund scholarships. A number of CECS students received young investigator awards, best speaker and best poster prizes at scientific meetings.

School Executive Committee

**Professor Napier M Thomson** MBBS MD FRACP Head of Medicine at The Alfred (Head of School)

**Professor Stephen Cordner** MA MBBS BMedSc FRCPath FRCPA DMJ (Path) DipCrim Head of Forensic Medicine

**Professor Gabor Kovacs** MBBS MRCOG FRACOG Head of Obstetrics and Gynaecology Box Hill Hospital

**Professor John J McNeil** MBBS MSc PhD FRACP FAFPHM Head of Epidemiology & Preventive Medicine

**Professor Paul O’Brien** MBBS MD FRACS Head of Surgery at The Alfred

**Professor Hatem Salem** MB ChB MD MRCP MRCS FRACP FRCPA Head of Medicine at Box Hill

**Associate Professor Morry Silberstein** MBBS (Hons) MD DRACR FRANZCR Assistant Dean Clinical School

**Professor Ban-Hock Toh** MBBS PhD DSc FRACP FRCPA Head of Pathology & Immunology

**Ms Gillian A Holley** BBus GDipAcc AFAIM AHRI (School Manager)
Department of Epidemiology & Preventive Medicine

Head
Professor John J McNeil MBBS
MSc PhD FRACP FAFPHM

Personal Assistant
Wendy P Chadwick

Finance Manager
Vanessa R Fernandes

IT Manager
Colin J Fee

Data Manager
Steven J White BComm DipIT BA
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Administration Officers
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Natalie D Holsinger
Emma M Kane
Shaarn E Montgomery
Maida O’Keefe
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Kelli L Tracey
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MIntBusAdmin
Phyllis Toparlanis
Sevim Zongur

Casual General Staff
Julie E Attard
Jane Ball
Moira Goddard
Emma Link
Renee McIroy
Katherine Young

Academic Staff

Professors
Johannes U Stoelwinder
Andrew M Tonkin MBBS MD
MRACP FRACP

Visiting Professor
Henrik Schirmer MD PhD

Associate Professors
Michael J Abramson MBBS
(Hons) BMedSc PhD FRACP
FAFPHM

Rachelle Buchbinder MBBS
(Hons) MSc (Clin Epi) FRACP
Flavia M Cicuttini MBBS (Hons)
MSc PhD DHTM FRACP
FAFPHM
Caroline Finch MSc PhD ASTAT
BSc FASMF
Andrew B Forbes BSc (Hons)
MSc PhD
Henry Krum MBBS PhD FRACP
Malcolm Sim BMedSc MBBS
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FFOM FAFPHM

Senior Lecturers

Neville Betts BA
GDipOccHazMan
Esther Briganti MBBS
GDipClinEpi FRACP MClinEpi
CertHealthEcon
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FAFPHM FACOM
David G Goddard BMedSc MBBS
DOH FAFOM MFOM
GradCertHigherEd
CertPestControl RACP
Lee Gruner BSc MBBS FRACMA
BHA MBA GAICD
R Bruce Hocking MBBS
FRACGP FAFOM
Joseph Ibrahim MBBS FRACP
MHA PhD
Sandy Leggat BSc (Hons) MBA
MHS PhD
Jennifer Majoour MBBS MHA
FRACMA PhD

Lecturers
Anthony D LaMontagne BSc ScD
MA Med
Stephen Lim BSc (Hons)
Dean McKenzie BA MSc
Vasuki Prabaharan BScem
GradDipStats MAS

Honorary Professor
Damien Jolley MSc MEd DipEd
CStat

Honorary Associate Professors
Chris Gray PhD
William Hart MBBS MAPs
FAFPHM
Paul Myles MBBS DipRACOG
MPH MD FFARCS
FFARCS
Frank Rosenfeldt MBBS MD
FRCS FRACS
Philip Stokoe MBBS DPH MSc
MPH
Michael Toole BMedSc MBBS
DipTropMedHyz

Honorary Associates of the Department
Michael Ackland MBBS MPH
FAFPHM
Todd Baumgartner MD MPH
Suzanne Garland MBBS FRCPA
MASM
Kim Hill MBBS MHP FRACMA
Graeme Johnstone LLB BJur MA
Bruce Levy BSc LLB

Alex Proudfoot BSc (Hons)
MEngSc BMch
Graham Rouch MBBS DPH
Howard Smith MBChB MD
MRACP FRACP FFPM
Michael Walsh MBBS (Hons)
BHA MPA FRACMA

Honorary Senior Lecturers
Zahid Ansari MS MPH MBBS
Kathryn Antioch BA (Hons) MSc
(UBC) MIHM AFCHSE CHE
Robert Baker BSc (Hon) PhD
Ronald Borland BSc (Hons) MSc
PhD
Robin Burns BA (Hons) MSc
MPH DipEd PhD
John Crofts MBBS MPH
FAFPHM
Peter Deutschmann MBBS
FRAC MPrimCare
Sherene Devaneson MBBS
DipObs FRACMA FACCHSE
Leigh Hammond MBBS FRCPA
Wendy Holmes MBBS MSc
EW Knight MBBS FAFOM
Vivian Lin BA MPH PH
Trish Livingston BA (Hons) PhD
Kevin McDonald BMedSc
MBBS FAFOM
Anne-Marie Pellizzier MBBS
FRACP PhD
Josef Reum MA PhD
Tilman Ruff MBBS (Hons)
FRACP
Sandra Thompson MBBS MPH
PhD FAFPHM
Amanda Thrift PhD
Michael Toole BMedSc MBBS
DipTropMedHyz
Sara Watson MBChB BSc MHA
FRACMA
Heather Wellington MBBS
BMedSc BHA FRACMA
Joanne Williams BSc (Hons)
MAppEpi PhD
Owen Williamson MBBS
GDipClinEpi FRACS

Honorary Lecturers
Tamara Aboagye-Kwarteng MSc
PhD GDipEpi
Stephen Begg BA (Hons) MPH
Shin Choo BPharm
GradDipHosPharm CertHlthEco
Noel Cranassa MBBS BMEdSc
FRACP (Paeds)
Margaret Curran MBChB MPH
FRCPath FFPM
Fabian Dalais BSc (Hons) PhD
Maximilian de Courten
David Dunstan BAppSc (Hons)
PhD
Danny YH Liew BMedSc MBBS FRACP
Stephen S-P Lim BSc (Hons)
Beatrice Loff MA Lond BA LLB
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Mark R Nelson MBBS MFamMed
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Anne-Marie Pellizzer MBBS FRACP
Louise Prentice MBBS FRACP
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Brent Robertson MBBS
Karen L Smith BSc (Hons) GDipEpi&Biostat
Hugo Stephenson BSc MBBS
Rhonda L Stuart MBBS FRACP
M Rwth Stuckey BAppSc GradDipErg MPH
Anita E Wluka MBBS DipIntMed FRACP
Boheng Zhang MBBS MMed
Occupational Trainee
Stephanie D Hildebrandt BNutrSc
The Department of Epidemiology and Preventive Medicine (DEPM) employs almost one hundred staff and plays a prominent role in public health medicine in Australia. The core skills of the Department relate to epidemiology (the study of the distribution, risk factors and causes of disease) and its application to problems in clinical medicine and public health. Research carried out in the Department includes clinical trials, economic evaluations of health services, quality of care assessments, environmental health studies and many others.

Research units within the Department not only collaborate with each other, but with other departments at Monash and The Alfred Hospital, and with other universities, resulting in research based on the most up to date knowledge and methods.

**Research Units in the Department in 2002 were –**

- Biostatistics Unit (Head, A/Prof Andrew Forbes)
- Cardiovascular Research Unit (Head, Prof Andrew Tonkin)
- Clinical Epidemiology Unit (Head, A/Prof Michael Abramson)
- Clinical Measurement Unit (Head, A/Prof Rachelle Buchbinder)
- Clinical Pharmacology Unit (Head, A/Prof Henry Krum)
- Diagnostics Unit (Head, A/Prof Flavia Cicuttini)
- Epidemiological Modelling Unit (Head, Dr Theo Vos)
- Health Services Management & Research Unit (Head, Prof Just Stoelwinder)
- Infectious Disease Unit (Head, Dr Karin Leder)
- Occupational and Environmental Health Unit (Head, A/Prof Malcolm Sim)
- Preventive Medicine Unit (Head, Prof John McNeil)
- Trauma and Sports Injury Prevention Research Unit (Head, A/Prof Caroline Finch)

In 2003, an Aviation Medicine Unit was also established in the Department headed by Dr David Newman.

The Diagnostics Unit headed by Flavia Cicuttini completed a significant body of work developing and validating MRI cartilage volume measurement as an outcome measurement in degenerative joint disease, and established this group as leaders on the international front in this developing area. Flavia is also an investigator on two newly established NHMRC Centres of Clinical Research Excellence, the Alfred / Monash Centre for Therapeutics and Clinical Research, and a longitudinal study of women’s health based at the Jean Hailles Center.

The Health Services Management and Research Unit continues to grow, with Professor Just Stoelwinder joining the Department during 2002 to head the unit. Professor John McNeil directs the health services research program of the unit.

The Occupational & Environmental Health Unit commenced a pilot study of health in Australia’s surviving, male Korean War veterans, the comparison group a civilian sample of Australian males. The pilot study was announced by The Hon Danna Vale on 13 March and will help assess the most effective way to study this group. The main study should begin in 2003 and will involve all surviving Korean War veterans.

The Australian Gulf War Veterans Health Study, also carried out by the Occupational & Environmental Health Unit in collaboration with Health Services Australia and the Commonwealth Dept of Veterans Affairs and Defence, was completed in 2002 and a report submitted to the Department of Veterans Affairs. The report is available at [http://www.dva.gov.au/media/publicat/2003/gulfwarhs/index.htm](http://www.dva.gov.au/media/publicat/2003/gulfwarhs/index.htm)

The Department continued to lead the Public Health Program of the Cooperative Research Centre for Water Quality and Treatment, a joint venture between thirty participants from industry, research and governments from every State and Territory in Australia. Major CRC projects currently underway or envisaged to commence shortly are -

- National surveillance of water-associated adverse health outcomes
- An epidemiological study to assess whether conventional water treatment of poor quality water adequately protects public health
- A review of health aspects of rainwater tanks in urban Australia
- A review of health and environmental guidelines for water reuse
- Development of Evidence-Based, Strategic Water Quality Monitoring
Professor Henry Krum, Head of the Clinical Pharmacology Unit, was awarded an NHMRC Centre of Clinical Research Excellence grant to establish The Alfred / Monash Centre for Therapeutics and Clinical Research.

Professor Andrew Tonkin joined the Department and established the Cardiovascular Research Unit. One of the unit’s main studies is the Home Automated External Defibrillator Trial (HAT). Professor Tonkin is the principal Australian investigator for this study which involves 34 Australian hospitals. HATs is funded by the NIH and also involves the US, Canada, Australia, New Zealand and the UK.

**Funding in 2002**

The Department was very successful in 2002 in attracting major new funding. As well as Henry Krum’s NHMRC Centre of Clinical Research Excellence grant to establish The Alfred / Monash Centre for Therapeutics and Clinical Research, the Department is involved in a new consortium funded by the State Government, ‘Clinical Trials Victoria’. This is a collaboration between the Baker Institute, The Alfred Hospital, the Peter MacCallum Cancer Institute, Monash University and Neurosciences Victoria. The Premier, Mr Bracks and Innovation Minister, Mr Brumby, announced the consortium at the Peter MacCallum Cancer Institute in July.

Professor John McNeil and collaborators were awarded a five-year NHMRC grant to look at the risk and determinants of fatal and non-fatal coronary heart disease in the Melbourne Collaborative Cohort Study. Professor McNeil also received an NHMRC Project Grant to continue research looking at high dose folic acid and its ability to slow the progression of atheroma in renal failure. Associate Professor Michael Abramson was awarded an NHMRC Project Grant to look at whether fine particles in the air cause respiratory problems. Co-investigators are Dr Rory Wolfe, Dr Gregory Ayers and Professor Haydn Walters. Associate Professor Abramson was also awarded a Monash Small Grant to conduct research on genetic polymorphisms and the risk of lung cancer. Other collaborators on this grant are Dr Boheng Zhang and Dr Dallas English from the Cancer Council of Victoria. Associate Professor Michael Abramson is a member of the Respiratory Epidemiology Group, which was awarded a grant from the Rebeccia L Cooper Medical Research Foundation, and a grant from the LEW Carty Charitable Trust, to look at genetic and environmental risk factors for respiratory disease. Associate Professor Flavia Cicuttini was awarded an NHMRC Project Grant to look at the predictors of knee cartilage loss and a Shepherd Foundation Grant to look at low perimenopausal testosterone and oestradiol levels and osteoarthritis in women.

Bebe Loff, a lawyer and a PhD student at DEPM, was awarded a $1 Million grant from the National Institute of Health, USA, to create a Masters program in International Research Bioethics. Tony LaMontagne was awarded a VicHealth Senior Research Fellowship.

Five DEPM staff were awarded post-doctoral fellowships in 2002 – Emma Ashton was awarded an NHMRC Public Health Fellowship for four years to develop a research program focused on nutrition and cardiovascular disease. Esther Briganti was awarded the Don and Lorraine Jacquot Fellowship for 2003. Esther will be
examining current levels of cardiovascular disease, and trends and determinants of cardiovascular risk factor management in Australian adults with renal insufficiency. Belinda Gabbe was awarded an NHMRC Fellowship to investigate the long term outcomes following major trauma and sports injury. Dianna Magliano was awarded a National Heart Foundation Fellowship and is looking at cardiovascular disease risk factors. Anna Peeters was awarded a VicHealth Public Health Fellowship and will be returning to the Department in 2003 after several years working in Europe.

Several of our PhD students were successful in obtaining funding - Fiona Clay was awarded an NHMRC PhD Scholarship to look specifically at road trauma and its long term outcomes. Rebecca Braham was awarded an NHMRC PhD Scholarship for the final year of the AFIPP (Australian Football Injury Prevention Project). Tsharni Zazryn was awarded an NHMRC PhD Scholarship to undertake a project looking into chronic brain injuries in boxers. Steven Haas was awarded an NHMRC Scholarship to investigate medications used in chronic heart failure.

Special achievements

- Dr Jim Black was awarded the GJ Rouch Prize. This is the third year in a row, a PhD student from this Department has been the recipient of this award. Jim’s PhD thesis was “Artificial neural networks in epidemiology: Prediction and classification”. In 2001, Brent Robertson was awarded the GJ Rouch Prize (Case-control studies of cryptosporidiosis in Adelaide and Melbourne), and in 2000 Margaret Hellard was awarded the prize for the “Water Quality Study”. Jim Black left DEPM late in 2002 to take up the position of Head of Epidemiology at the Victorian Infectious Diseases Services, based at the Royal Melbourne Hospital. The prize is awarded by the Victorian Branch of the Australasian Faculty of Public Health Medicine and is awarded annually to the advanced training candidate in public health medicine who gives the best presentation of research work at a meeting of the faculty.

- Staff from the Trauma and Sports Injury and Prevention Research Unit were recognized for their work in 2002 during the 2002 Australian Conference of Science and Medicine in Sport – Belinda Gabbe was awarded the Ken Maguire Award for Best Young Investigator for her presentation on “Predictors of hamstring muscle strains at the community level of Australian football”; and Associate Professor Caroline Finch was co-author of a poster that won the Journal of Science and Medicine in Sport Award for Best Poster.

- Third year medicine Health Promotion students, working under the supervision of Associate Professor Caroline Finch, were awarded a VicHealth Outstanding Achievement award for their Health Promotion Project “Helmets – improving attitudes and awareness of ski and snowboard instructors”.

Teaching

The Department continues its extensive teaching program including undergraduate medical and biomedical science degrees, postgraduate courses, a range of Diplomas and Certificates, and several short courses.

In 2002, Bebe Loff, a PhD student at DEPM and a lawyer, was awarded a grant from the NIH in the US to establish a Masters program in International Research Bioethics.

In May, twenty-eight occupational and environmental health staff from the Indonesian Ministry of Health came to DEPM for a four week course in Occupational and Environmental Epidemiology and Environmental Health Risk Assessment.

The Master of Public Health is taught in collaboration with Deakin University, La Trobe University and The University of Melbourne, partners in the Victorian Consortium for Public Health. Monash continues to be the most popular choice for Victorian Master of Public Health students.
The Department also teaches the Australian Certificate of Civil Aviation Medicine, a two-week course which is a prerequisite for medical practitioners wishing to become Designated Aviation Medical Examiners, and ran another series of courses on impairment assessment for medical and surgical specialists for the Victorian WorkCover Authority and the Transport Accident Commission.

**PhD Opportunities**

DEPM provides high quality PhD research training to graduates from a broad spectrum of medical and non-medical backgrounds. Epidemiology, together with Biostatistics, are the key scientific disciplines underlying some of the most important and rapidly developing areas in medicine, and our PhD graduates are equipped with core skills which form the basis for a successful future career in a range of fields.

Recent PhD students have been drawn from fields of clinical medicine, medical administration, biological sciences, environmental health, occupational health, physiotherapy and law.

Current PhD students in the Department of Epidemiology & Preventive Medicine are -

- **Zahid Ansari** MBBS, FAFPHM, MSc, MPH – Proposal to develop a system to monitor aspects of the quality and performance of the Victorian healthcare system using routine data sources.
- **Chris Barton** BSc, MMEdSc - Aspects of care associated with optimal and sub-optimal asthma management in children.
- **Stephen Begg** BA (Hons), MPH – Cost-effectiveness of cardiovascular interventions.
- **Rebecca Braham** BSc (Hons) - The effectiveness of headgear and mouthguards for preventing football injuries.
- **Esther M Briganti** - The epidemiology of renal disease: an Australian perspective
- **Helen Cuddihy** MD, CCFP, FRACGP – Assessing the validity of new approaches to measure clinical competence in junior medical staff.
- **Rochelle Eime** BAppSc (Hons) - Protective eyewear use in squash - the role of regulation.
- **David Fish** - The contribution of worksite assessment to return to work rates
- **Michael Glisson** MAppSc, DAppSc (Med Rad) – Quantifying the influence of osteoarthritis by measuring changes in cartilage in the hip and knee.
- **Steven Haas** BPharm, BPharmSc (Hons) - Epidemiology of chronic heart failure.
- **Andrew Haydon** MBBS, FRACP - Adjuvant chemotherapy for Dukes C colon cancer; rates of treatment and the effectiveness of adjuvant SFU outside of controlled trials.
- **Catherine Joyce** BA (Hons), MPych - An integrated analysis of the health workforce in rural Australia.
- **Marion Kainer** BSc, MD – Infection control and hospital epidemiology.
- **Narges Khanjani** MD – Organochlorines and breast cancer.
- **Helen Kelsall** MBBS, MPH, MHealthSc, FAFPHM – A study of the health of Australian Gulf War veterans
- **Jimaima V Lako** - The glyceamic index (GI) and dietary antioxidants (DA) in the diets of the indigenous people of the south pacific.
- **Danny Liew** BMedSc, MBBS, FRACP - Epidemiological modelling of ischaemic heart disease in Australia.
- **Stephen Lim** BSc (Hons) - Cost effectiveness of interventions for cardiovascular disease in Australia.
• Bebe Loff MA (Lond), BA, LLB - Health and human rights.
• Caroline Marshall MBBS, GDipClinEpi, FRACP - The development of a method for subtyping methicillin-resistant staphylococcus aureasus (MRSA) and its use in the understanding of the epidemiology and transmission dynamics of MRSA and their implications for hospital infection.
• Paul Martin MB BCh, BA, BAO, MRCPI, FRACP – The effect of endothelin converting enzyme inhibition on ventricular remodeling assessed by echocardiography, haemodynamics, cardiac gene expression, myocyte cell death and cardiac fibrosis.
• Melanie Matheson MAppSc, BSc - Genetic and environmental risk factors for chronic obstructive pulmonary disease.
• Azizah Omar - Service marketing of telehealth within the information, communication and technology (ICT) environment
• Alex Padiglione MBBS, FRACP – Epidemiology of Vancomycin resistant bacteria in Melbourne.
• Anne-Marie Pellizzer MBBS, FRACP - The effect of pharmacological and non-pharmacological therapy on autonomic function in cardiovascular disease.
• Louise F Prentice - MRI of the knee in Osteoarthritis
• Wendy Probert MHSc, BSc(Hons) – Understanding of vaccination for MME and attitudes towards vaccination in young adults, as an adjunct to developing an educational campaign for measles elimination.
• Dimitrie H Stephenson - Application of artificial intelligence to improve quality of care in hospitals
• Brent Robertson MBBS - Case control study of sporadic cryptosporidiosis (passed in 2001)
• Karen Smith BSc (Hons), GDipEpi&Biostat - Pre-hospital emergency care. (submitted)
• Hugo Stephenson BSc, MBBS - Development of a reusable computerised decision support tool.
• Rhonda Stuart MBBS, FRACP - Nosocomial tuberculosis infection: Assessing the risk amongst health care workers.
• Ruth Stuckey BAppSc, GDipErgonomics, MPH - Evaluation of occupational health and safety models for corporate fleet safety.
• Anita Wluka MBBS, Dip Int Med, FRACP - The determinants of knee cartilage volume in health and disease.
• Boheng Zhang MBBS, MSc, BMed - Screening and chemoprevention for lung cancer in an asbestos exposed cohort.

Graduations in 2002

**Doctor of Philosophy**

James Francis Patrick Black

**Master of Clinical Epidemiology**

Robyn Leigh Craven MFamMed

**Master of Health Services Management**

Jigi Lucas GradDipHlthServMgt

Maria Triantafillou GradDipHlthSvcMgt

**Master of Occupational and Environmental Health**

Dominic Yong GradDipOccEnvHlth

**Master of Public Health**

Irvan Afriandi GradDipOcc&EnvHlth

Diana Mary Azzopardi

David George Bannister

Sally-anne Berger

Roslin Boltero

Siobhan Bourke MBBS

Margaret Ann Boyle

Stephen John Burgess

Catherine Chamberlain PGCHSM E. Cowan

Daniel Attila Csutoros MB BS

Andrew Wesley Dent

Gregory John Duncan BPharm

Soula Fillipas BPhysio *LaTrobe*

Judith Margaret Forsyth

Stephen Edward Gibbibs BSc

Linton Robert Harriss GradDipClinEpi

Gillian Maree Halliday

Kazi Ayesha Hossain

Laurine Faye Hurley BSc(Hons)

Aishath Jeelaan Ibrahim BA(Hons)

Penelope May Irwin

Sharon Maree Johnson BAppSc *Deakin*

GradDipWmnHlth *Melb*

Anne Elizabeth Johnston BAppSc *RMIT*

Mary Kaimakamis MHumNut *Deakin*

Sharon Maree Kane BA(Multi)

Susannah Jane King BSc(Hons) *Melb MNutDiet Deakin*

Jonathan Kruger

Carolyn McLennan

Peter David McNair

Cindy Nagy Milford BS BSc

GradDipArts(DevelStud)

Anne Piva Moates BAppSc(Nurs)

Stephanie Jane Poustie
Margaret Rowell
Catherine Sharples
Jean Marie Spinks BPharm Syd
Clare Frances Stainsby MBBS GradDipIntHlth
Voula Zographo Stathakis BSc LaT GradDipEpid
Melb
Anke Elisabeth van der Sterren BA Penn MA ANU
Alexander Stockman
Felicity Anne Topp
Wrania Vlahos
Kathy Vu
Patricia Ellen Wakefield
Katrina Janet Ross Watson MBBS Melb
Publications


Abramson M, Dharmage S, Thien F, Walters EH. Sensitisation to airborne moulds and severity of asthma. (Letter). http://bmj.com/cgi/eletters/325/7361/411@25053


Loff B. Africans discuss ethics of biomedical research. The Lancet 2002;359:956.


Book chapters


Department of Forensic Medicine

Head
Stephen M Cordner MA Lond
MBBS Melb BMedSc Melb
FRCPA FRCPA DMJ (Path)
DipCrim Melb

Personal Assistant
Melinda Franks

Resources Manager
Russell J Evans BA (SocSc)

IT Manager
Vicky C Winship

Administration Officers
Carole Bickle
Deborah Hope (to May 2002)
Patricia A O’Brien GDipCrim Melb
MBA BA Monash RN RM
Gavin Reichel

Academic Staff
Adjunct Professor
Olaf H Drummer PhD (Med) Melb
BAppSc (Chem) RMIT MRACI
ARCPA

Associate Professors
John Clement BDS PhD Lond LDS
RCS Eng DipFOd LHMC
Ian Freckleton PhD LLB Syd
Frank McDermott
David Ranson BMedSc MBBS
Nottn LLB West of Eng FRCPA
FRCPA MDJ DipCrim Melb

Senior Lecturers
Bentley Atchison BAgSc (Hons)
PhD Adel
Michael Burke BSc MBBS FRCPA
DipForensPath
Leanna Darvall LLB Melb PhD
Malcolm Dodd MBBS Melb
DipMLT AAIMLT FACBS FRCPA
MACLM
Lynette Ireland BAppSc RMIT MSc
GDip MGTMASM
Matthew Lynch MBBS Melb LLB
FRCPA DipForensPath FACLM
Ian McVey FRCS Eng FRACS
Morris Odell BE MBBS Melb
FRACGP DMJ (Clin)
Shelley D Robertson MBBS Melb
LLB Melb FRCPA DMJ (Path)
FACLM DAvMed (Otago)
Alexandra Welborn MBBS WA
FRACGP DMJ (Clin)
David Wells MA (Crim) Melb
FRACGP Dip DRACOG
DMJ (Clin)

Lecturers
Jodie Leditschke PhD Monash
Helen Parker MBBS Melb FACEM

Research Staff
Leonie Baker
Jim Gerostamoulos
Dennis Gyomber
Joe Ibrahim
Matthew Lynch
Adam O’Brien
Anne Tremayne

Post Graduate Students
Sarsha Collett
Mark Chu
Stacey Emmett
Kabrena Goeringer
Arthur Smardencas
Angela A Y Tan
The Department of Forensic Medicine was established 15 years ago at the same time as the Victorian Institute of Forensic Medicine was established by the Coroners Act (1985). Together they provide a range of forensic medical services in Victoria as well as undergraduate and postgraduate education and research in forensic medical and forensic scientific disciplines.

**Research Units in the Department are** –
- Forensic Pathology
- Clinical Forensic Medicine
- Forensic Scientific /Road Safety
- Forensic Entomolgy
- Adverse Medical Treatment Events

**Research in 2002**

The Department has had an active research program in 2002.

Professor Olaf Drummer has continued his research into the involvement of drugs in driving with support from VicRoads and other road safety groups. The focus has been on investigating the role of cannabis use and road crash risk. A number of reports were produced during the year. This research was extended into establishing the incidence of drugs (licit and illicit) in blood from injured persons involved in motor vehicle crashes. A number of multi-media products are being produced to assist in the education of the public and specific community groups against the dangers of drug use. The project was funded by VicRoads and conducted in collaboration with the Divisions of Scientific Services and Clinical Forensic Medicine and the Alfred Hospital Accident and Emergency Centre. Investigators were Professor Olaf Drummer, Dr Morris Odell and Dr Jim Gerostamoulos.

A number of studies supervised by Professor Drummer have also focused on the analysis of drugs in hair and oral fluid (saliva). Hair offers the advantage of determining a longer time frame of drug use than conventional tissues, and through segmental analysis can often provide information spanning 3-6 months. This technique is being used in research projects including the use of hair to determine abstinence from drug use in persons in drug treatment programs. The analysis of drugs in oral fluid allows a non-invasive way to rapidly test drug use in a workplace or at a roadside, and has therefore wide applicability in the community. Studies are being conducted to establish the reliability of such analyses.

Adverse medical treatment events are subject to close scrutiny in forensic pathology practice. Funded by the Department of Human Services, this project reviews cases and provides data to the Department and to the Coroner. A number of subsidiary specialist projects are being undertaken including post surgical deaths associated with pulmonary thromboembolus and deaths associated with undiagnosed cardiac disease. The investigators were Clinical Assoc Professor David Ranson, Ms Leonie Baker and Dr Dennis Gyomber.
The interaction and communication between Coroners and Health Departments has the capacity to influence death investigation and public policy regarding the prevention of adverse medical treatment events. Currently funding from the Australian Council for Safety and Quality in Health Care is supporting a review of legislative and operational arrangements within Coroners and Health Departments throughout all States and Territories in Australia. Investigators are Clinical Assoc Professor David Ranson, Ms Leonie Baker and Dr J Ibrahim.

Information for families regarding health risks identified incidentally during an autopsy on a relative has been recognised by the department as a potential public health activity worthy of ongoing research. Current investigations are aimed at determining the scope of this information and what is required to address the disease prevention and mitigation potential of its use. Investigators are Dr Matthew Lynch, Associate Professor David Ranson and Professor Stephen Cordner.

Coronial investigation of adverse medical treatment events is currently under intense scrutiny and investigation procedures have been found to be deficient in a number of studies. This project involves a 2 year review and reorganisation of such investigations and analysis of major issues in health care provision that can lead to death. Investigators are Clinical Associate Professor David Ranson, Ms Leonie Baker and Dr A O’Brien.

Law relating to coronial jurisdiction on infants and stillbirths has caused considerable difficulties in recent years. Changes in technology have resulted in these issues arising more frequently but without substantial legislative review. Legislation and operational procedures are being reviewed with a view to suggestions for legislative amendment. Investigators are Dr Matthew Lynch, and Clinical Associate Professor David Ranson.

Industrial Disease is an area that has not previously received much focus within forensic pathology and coroners practice in Australia. This is in contrast to practice in many other jurisdictions such as the United Kingdom. Current projects involve a review of the role of the coroner and forensic pathologists in this area. Investigators are Professor Stephen Cordner, Clinical Associate Professor David Ranson, Dr Matthew Lynch, and staff of the State Coroners Office.

The Monash University National Centre for Coronial Information (MUNCCI) is a research centre of the University, located at the Victorian Institute of Forensic Medicine (VIFM). MUNCCI is a consortium of three Monash University bodies, namely VIFM, the Monash University Accident Research Centre (MUARC) and the Department of Epidemiology and Preventive Medicine. MUNCCI’s role is to develop and manage the National Coroners Information System (NCIS). The NCIS is a world first national database of coronial information that will contribute to a reduction in the incidence of unnatural death and injury in Australia. The vision of MUNCCI is for the NCIS to be recognised nationally and internationally as being at the forefront of the timely provision of national coronial data, which is comprehensive, reliable and up to date. This coronial data will facilitate the role of the coroners around Australia in preventing death and injury, whilst at the same time providing a valuable resource to policy makers and researchers.

MUNCCI continued working closely with the Commonwealth Department of Health and Ageing (DHA) on the implementation of strategies to improve the quantity and quality of data on water and drug related deaths. In particular, MUNCCI worked with police in each jurisdiction to obtain endorsement of the proposed national standard police form for reporting of coronial deaths. A successful submission for funding was made by MUNCCI to DHA in January 2002 to implement the new National Initial Police Investigation Form. Details of the project and the activities of the Centre, including applications to access data, can be obtained at www.vifp.monash.edu.au/ncis.
The Consultative Committee on Road Traffic Fatalities was established in 1992 by the Victorian Road Trauma Committee of the Royal College of Surgeons and the Victorian Institute of Forensic Medicine. The objectives are to identify errors and/or inadequacies in the emergency and clinical management of road trauma fatalities who were alive at the time of the arrival of ambulance services. The committee has similarly examined a group of non-road trauma fatalities and has evaluated the management of crash survivors with neurological disability following head injury. This committee has had several funding sources. It is currently funded by the Victorian Trauma Foundation and managed by Professor McDermot and Professor Cordner in conjunction with Ms. Anne Tremayne, the project manager.

The work of this project team played a major part in the review and reform of Victorian trauma care services and the group is now evaluating the impact of these changes.

During 2002 the Department –

- Conducted a range of activities relating to improvements in public health, including adverse medical events, road trauma, industrial disease and the impact of drugs
- Expanded the range of subjects available in the postgraduate program in forensic medicine
- Continued to manage the development of the National Coroner’s database as part of the national consortium
- Commenced the development of a new postgraduate program in Forensic Pathology.

Special achievements

The Department of Forensic Medicine contributed towards improving the health of persons through case investigations and research.

Teaching

The Institute has had a significant input in the provision of teaching and training on a range of forensic topics during the year. Institute staff has acted as examiners and supervisors for a range of undergraduate
and postgraduate programs as well as for professional bodies such as the Royal College of Pathologists of Australasia. Programs have been provided to:

- Medical, Science, nursing and law undergraduates
- Medical post-graduates and various specialty groups
- Medical laboratory science students and undergraduates
- Police and Department of Human Services
- Legal profession
- Community groups, service organisations and schools

Current developments in medical law and ethics are a major focus of programme development for undergraduates. Dr Leanna Darvall Senior Lecturer in Medical Law is responsible for development of the medical law program within the medical faculty, assisted by a team of twelve experienced medical law lawyers. The first year component was successfully taught in 2002. Her position is funded by a consortium from Victoria’s medical defence community: Medical Defence Association of Victoria, Medical Indemnity Protection Society and Professional Management Australia.

Final year medical students attend the Institute on rotation for two days. Lectures given over this time cover aspects of law relevant to future practising medical practitioners, clinical forensic medicine, forensic toxicology, writing of medico-legal reports and an introduction to forensic odontology. The sessions end with students participating in a moot court, where they are required to give evidence and are subjected to cross examination by Coroner’s Assistants. This is in addition to elective programs for medical students from Monash, the University of Melbourne and overseas.

Postgraduate Program in Forensic Medicine
This program is offered through the Department of Forensic Medicine at Monash University. Offered through distance education mode, it is believed to be unique as the only university post graduate program in clinical forensic medicine.

The program is open to medical practitioners who are (or may be contemplating) providing forensic medical services. To date, students from every Australian state and territory have enrolled. More recently, enrolments have also been received from Africa, South East Asia and the Pacific. The course is available at Certificate, Diploma & Masters levels. The last 12 months have seen a number of advances in the program:

- The Institute in conjunction with the Indo Pacific Association of Law, Medicine & Science is offering an annual scholarship to medical graduates for developing countries. The scholarship covers the cost of all tuition fees and accommodation during attendance at the Institute. The first recipient is Dr Nadine Agnew, a State Medical Officer and pathologist from Namibia.
- The development and offering of two new subjects; Traffic Medicine and Elements of Forensic Toxicology.
PhD Opportunities
The Department of Forensic Medicine offers PhD research training opportunities in a range of disciplines including forensic and analytical toxicology, molecular biology, clinical forensic medicine, applications of forensic and anatomical pathology and tissue banking techniques. Past graduates have been equipped with highly sought after skills to establish a successful career in one of the branches of forensic science or medicine.

Our current PhD students are -

- **Mark Chu** has continued his doctoral studies into the toxicology of cannabis. His research focused on the measurement of THC, its stability and distribution in postmortem tissues and its involvement in road crashes. Significant progress was made in the understanding of the toxicology of THC and has led to a number of reports and presentations.

- **Kabrena Goeringer** completed her studies on the toxicology of serotonin active drugs such as the serotonin reuptake inhibitors and other psychiatric drugs. Her work focused on the use of LC-MS techniques for detecting such drugs as well as using this technique for drugs-of-abuse screening. A number of studies were conducted in collaboration with Dr Brian Dean of the Mental Health Research Institute. These focused on the distribution of antipsychotic drugs in brain regions.

- **Angela Tan** has been researching the development of rapid DNA profiling techniques based on a mini-chip concept. The aim of the project will be to combine this technique with amplification in a microchip format using rolling circle amplification. This will speed up conventional DNA analysis.

- **Arthur Smardencas** has been based at BioNova, a biotechnology firm specialising in artificial vascular grafts. Arthur’s project has been evaluating a number of aspects of the re-endothelialisation of these grafts using a sheep model. Arthur submitted his thesis in November 2002.

Graduations
Students graduating in 2002 were:

- Josie Spataro PhD
- Angela Cresswell MBBS Grad Dip Forensic Medicine
- Matthew Ryan MBBS Grad Dip Forensic Medicine
- Peter Wearne MBBS WA MPH Grad Dip Forensic Medicine

Publications
Conference Papers


Research Papers


**Books and Encyclopaedias**


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Napier M Thomson MBBS MD Adel FRACP

Personal Assistant/Admin Officer
Marilyn L Bushell

Business Manager
Gillian Holley BBus (Mgt) GDipAcc
AFAIM AHRI

Technical Services Manager
Simon P Barrett BSc (Hons) PhD

IT Manager
Ian G Sloan BSc (Hons) PhD

Finance Officer
Helen Dinh Assoc Dip (Acct)

HR Officer
Effie Apostolou

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Dharshini Wignarajah
Maro Williams
Edwina Wright
Miranda Xhilaga
Dong Cheng Zhang BMEd
The Department of Medicine at The Alfred has a major undergraduate teaching commitment throughout the whole medical course and also contributes to teaching programs in the Bachelor of Biomedical Science. It has an Honours program for science and biomedical science students and there are currently 66 postgraduate research students enrolled through the department.

**Current research programs of the Department include –**

- Immunobiology of asthma, progressive chronic lung damage, lung transplantation and sleep apnoea
- Cardiovascular (in collaboration with the Baker Research Institute): heart failure (human and experimental) immunobiology of heart transplantation
- Haematology: clotting abnormalities, haematological malignancy and bone marrow transplantation
- Neurosciences: biological mechanisms of adult neurogenic diseases; neuropsychology of Alzheimer’s disease, cerebellar degeneration and cardiac failure; quantification of ataxia: Van Cleef Roet Centre for Nervous Diseases
- Renal disease: immunobiology of progressive renal damage, diabetic nephropathy and allograft rejection
- Rheumatology: immunobiology of inflammatory arthritis
- Gastroenterology: vascular pathophysiology in chronic liver disease
- Clinical pharmacology: drug evaluation (clinical and experimental)
- Oncology: national and international therapeutic trials
- Bioethics: Centre for Ethics and Medicine in Society
- Infectious Diseases: HIV, HIV brain disease, immunization

**Research**

**Van Cleef Roet Centre for Nervous Diseases**

**Professor Elsdon Storey**

The Van Cleef Roet Centre for Nervous Diseases was created in September 1996, with the appointment of the first Director, Professor Elsdon Storey. Base recurrent funding for the Centre was derived from income generated from the Van Cleef Foundation capital, which was handed over to Monash University by the Van Cleef Trustees at that time. The Van Cleef Foundation itself had been created over 30 years earlier, as the result of a bequest from Mr. Louis Roet for the establishment of a Centre of Neuroscience at the Alfred Hospital, where Mr. Roet’s own brain tumour had been successfully treated.

The Van Cleef Roet Centre has a wide remit, including neurological research, teaching and training in clinical neurosciences, and education of the public in neurological diseases.

The Centre is a part of Neurosciences Victoria, through its membership of the Monash Node of NSV. In 2002, the Monash Institute for Neurological Disease (MIND) acted as the Monash Node, with Professor Storey as its Vice-Chairman.

The Monash Node is one of three nodes of Neurosciences Victoria, a state-wide consortium of neuroscience researchers that attracted a $14 million STI priming grant from the State Government spread over three years. These monies have largely been used to establish five technology platforms, available to all NSV members. Van Cleef Roet Centre members are eligible to apply for NSV funds. So far Ms Renae Walsh has successfully applied for a PhD scholarship (2002-2004 inclusive).

At a collaborative level, our links with the Psychology Department at La Trobe continue, through shared research projects. Professor Storey is now Associate Supervisor for two La Trobe Neuropsychology PhD students.

The Centre continues to be active in three principal areas of research:

i) delineation of previously undescribed neurogenetic diseases,

ii) neuropsychological studies in degenerative nervous diseases, and

iii) basic cell/neurological studies in inherited neurological disease.

In the first area, our description of the third novel form of cerebellar ataxia described by our group has been submitted for publication, and data collection has been finished on a potential fourth. Our collaborators in this work have been from the Murdoch Institute, Royal Children’s Hospital.

In the second area, our collaborative work with the Departments of Psychology at Melbourne and La Trobe Universities continued, and resulted in several publications. We also obtained NH & MRC project grant funding for an expansion of our work on neuropsychological aspects of inherited ataxias, and presented our preliminary work in
this field at an international meeting in Vancouver. We have also commenced a project on cognition in heart failure, with Monash Small Grant funding, in collaboration with Professor Henry Krum (Clinical Pharmacology).

The third area is much more difficult, as this laboratory-based project necessitates that we make our own reagents (monoclonal antibodies, recombinant proteins, etc.) before the planned experiments can be performed. Steady although unspectacular progress has been made, and this work formed part of a successful NH & MRC Program Grant application under Professor Colin Masters’ overall direction in 2001. This work has also attracted competitive Neurosciences Victoria funding, as it has potential commercial implications.

Clinical Pharmacology

Associate Professor Henry Krum

The Clinical Pharmacology Unit conducts mechanistic trials of new and existing drug therapies. It also serves as a coordinating centre for multi-centre clinical trials. Such trials ongoing at present include:

- UNIVERSE: study of statin therapy in the treatment of heart failure
- CHAT: NHMRC-sponsored study looking at the utility of telephone support in rural and remote areas for the patient with heart failure to prevent rehospitalisation
- CHABLIS: study of addition of ARB versus increasing the dose of ACE inhibitor in patients with systolic heart failure
- COLA II: prospective open-label study of tolerability of administration of the beta-blocker, carvedilol, to elderly patients with heart failure

The unit also conducts a number of basic research programs. Current programs include:

- Role of urotensin II in cardiac disease (NHMRC supported)
- Role of p38 MAP kinase system in heart failure disease progression
- Anti-fibrotic effects of statin therapies in cardiac cells

The Clinical Pharmacology Unit is part of the newly established Alfred/Monash Centre of Research Excellence in Therapeutics awarded $2 million over 5 yrs by NHMRC.

Medical Oncology

Clinical Associate Professor Max Schwarz

The Medical Oncology Unit continues to provide a comprehensive multi-disciplinary cancer service and major primary care facility for patients with malignancy as part of The Alfred Blood Diseases and Cancer Clinic. Patient care is coordinated with the Palliative Care Service.

The Alfred was the first major teaching hospital to establish a Medical Oncology Service in August 1977, following the return of Associate Professor Max Schwarz from postgraduate studies at the MD Anderson Cancer Center, University of Texas, USA. At that time, the Medical Oncology Service functioned through the General Medical Unit structure of the hospital, which was revised in the mid 1980s following a planned change in hospital function and future development. The Medical Oncology Unit was formalised in 1989.

The Unit’s major ongoing research relates to clinical trial activity, as summarised below.

The Palliative Care Service provides a consultation service to inpatients living with progressive, incurable disease. In addition to inpatient consultations, an outpatient service is provided, which is unique among the major metropolitan hospitals. Palliative Care input to HIV/AIDS patients is now provided by the Palliative Care Service, following the restructure of the Victorian AIDS Palliative Care Consultancy.

Dr Jennifer Philip, is undertaking a PhD funded by a three year NHMRC Medical Postgraduate Scholarship (Palliative Care). She will examine the difficulties and core ethical issues involved in providing palliative care for a complex group of patients.

The Palliative Care Service continues to focus on clinical issues, including symptom management. Current research projects are:

- Randomised, double-blind, cross-over trial of the effect of oxygen on dyspnoea in patients with advanced cancer
- Symptom prevalence and longitudinal patterns of symptoms in palliative care inpatients

Our collaborators are:
Current projects are:
- A collaborative multicentre phase II study of neoadjuvant doxorubicin and docetaxel in patients with locally advanced breast cancer (The Breast Cancer Sub-committee of the Victorian Cooperative Oncology Group)
- The Family Impact Project: examining the impact of the cancer diagnosis and treatment on cancer patients and their families (School of Psychology, Deakin University)
- Phase II study of gemcitabine integrated with concomitant 5-FU and 3-D conformal radiotherapy for the treatment of localised pancreatic cancer (the Australian Pancreatic Cancer Study Group, in collaboration with Radiation Oncology)
- Effects of chemotherapy on cognition among colorectal cancer patients receiving adjuvant chemotherapy (School of Psychology, Deakin University)
- Living with prostate cancer research: psychiatric morbidity, quality of life and coping styles of patients with early stage and advanced prostate cancer (NHMRC, in collaboration with Radiation Oncology)
- Multicenter phase III randomised trial comparing doxorubicin and cyclophosphamide followed by docetaxel (AC→T) with doxorubicin and cyclophosphamide followed by docetaxel and trastuzumab (AC→TH) and with docetaxel, platinum salt and trastuzumab (TCH) in the adjuvant treatment of node positive and high risk node negative patients with operable breast cancer containing the Her2neu alteration (Breast Cancer International Research Group BCIRG 006)
- A phase III adjuvant trial in pancreatic cancer comparing 5-fluorouracil and D-L folinic acid vs gemcitabine vs no adjuvant treatment (ESPAC-3)
- Phase III randomised trial of concomitant radiation, cisplatin and tirapazamine (SR259075) versus concomitant radiation and cisplatin in patients with advanced head and neck cancer (in collaboration with Dr Sidney Davis, Radiation Oncology)

Funding in 2002

Professor Thomson and Dr Stein-Oakley received $107,588.80 as part of a two year grant from Pfizer in the UK for study of renal ischaemia and reperfusion injury. Alfred Research Trust awarded Professor Thomson $20,000.00. The Wellcome Trust in the UK awarded the Department $180,991.00 in 2002 to set up the ABI Prism Sequence Detection System.

Neurosciences received $280,000 as infrastructure funding from the Van Cleef Roet investments. Professor Storey is a chief investigator on Professor Masters of The University of Melbourne’s successful NH & MRC Program Grant, receiving $60,000 pa for 5 years. With Professor Krum, Professor Storey received a Monash Small Grant for $37,000 to investigate cognition in cardiac failure. $30,000 from an NH & MRC Program Grant on protein mis-folding in neurodegeneration was received by Neurosciences, as well as an Alfred Hospital Research Grant of $65,000 for one year for continuing work into the pathogenesis of polyglutamine repeat disorders.

Other grants received by Neurosciences included a Monash Small Grant for $27,000 for a project examining cognition and its reversibility in cardiac failure; an Australian Rotary Health Research Grant for $20,000 with
Associate Professor Glynda Kinsella (La Trobe University) on family intervention for memory disorders in Alzheimer’s dementia; $5,000 from the Alfred Research Fund to Clinical Neurophysiology scientist, Kate Tuck; and $40,000 from Pfizer for an Advanced Epilepsy/Clinical Neurophysiology Trainee position.

The Cancer Council of Victoria provided $70,592 to Oncology for a Clinical Trials Management Scheme and the Alfred Research Trusts (Peter Grant Hay Trust) provided $35,000, as well as funding from various commercially sponsored clinical trials.

Immunobiology of Asthma received a Monash University Research Fund Grant of $50,236.00

Assoc Professor Komesaroff received $70,500.00 as part of Adelaide University’s WISDOM grant.

Professor Wesselingh received an NH&MRC Project grant payment of $110,660.00.

Associate Professor Trevor Williams received $25,000.00 from the Alfred Research Trust towards his research into lung transplants as well as other donations totalling $68,497.00. Associate Professor John Wilson received a Merck grant of $15,916.45.

Eight post graduate students of the Department were awarded NH&MRC scholarships totalling $187,811; two students received National Heart Found scholarships totalling $20,000, and seven students received Alfred Research Trust Scholarships totalling $68,311.

**During 2002 the Department** –

The Department’s laboratories moved into the new premises in the Alfred Medical Research and Education Precinct (AMREP) building which has enabled greater collaboration with other departments of the school, as well as with the Baker Heart Research Institute and the MacFarlane Burnet Institute.

The Department of Medicine’s Ms Fiona See received the Baker’s prize for Basic Scientific Cardiovascular Research, Mr Darren Mansfield received the Michael J Hall Prize in Respiratory Medicine/Physiology/Lung Transplantation and Ms Kylie O’Brien received a Faculty Postgraduate Excellence Award.

**Teaching**

The Department is very grateful for its network of consultant physicians and PhD candidates who contributed significantly to both undergraduate and post-graduate medical education. The Case-Based Learning (CBL) program was central to the innovative 4th year undergraduate curriculum, with tutorials based around actual patient consultations performed by participating students in the areas of heart failure, stroke, renal failure and anaemia. "Bedside" clinical skill teaching commenced in 4th year was reinforced in the 5th year program and supplemented by a lecture program. Final year students participated in a lecture program and joined both the Professional General Medical Unit and other specialty units for "electives" and the popular "student intern" program. HMO education sessions and the FRACP tutorial program were also strongly supported by the Department. Neurosciences give lectures and run several practical classes for Years 2 and 3 of the Bachelor of Behavioural Neuroscience course.

**PhD Opportunities**

The Department of Medicine at The Alfred Hospital is a centre for clinical and biomedical research and education, offering postgraduate study in

- allergy, asthma and clinical immunology
- clinical pharmacology
- cardiovascular disease
- ethics in medicine and society
- infectious diseases
- neuroscience
- organ transplantation
- renal disease
- respiratory medicine
- rheumatology

The Department also offers postgraduate research programs for Masters of Biomedical Science, as well as honours programs for Bachelor of Science, Bachelor of Biomedical Science and Bachelor of Medical Science. Students perform the coursework that is most relevant to their background and their field of research.
Graduations during 2002

MSc
Athena Bombas BSc Hons

PhD
Olga Bakharevski MD *Moscow State* GradDipImm
Maja Divjak BAppSc (Hons) *UTS*
Eric Mervyn Glare
Deepak Haikerwal
Katarzyna Kedzierska
Robyn Gaye Langham
Melinda Maree Parnell
Peter Solin MBBS *Melb*
Miranda Xhilaga MBBS *Tirana* GradDipImm

PhD students in the Department of Medicine at The Alfred during 2002 –

- **Anuradha (Ann) Aggarwal**  Sympathetic nervous function and its modification in heart failure (completed and passed)
- **Belinda Anne Ahlers**  The L-Arginine: nitric oxide pathway in human heart failure - L-Arginine transporter and nitric oxide synthase
- **Rula Azzam**  Mechanisms underlying HIV-mediated inhibition of macrophage effector functions
- **Olga Bakharevski**  Study of early immunopathological synovial events in experimental type II collagen-induced arthritis in the rat (completed and passed)
- **Mandy Louise Ballinger**  Role of tyrosine kinases in controlling glycosaminoglycan length of vascular proteoglycans
- **Tiffany Lisette Bamford**  IL-13 and airway wall remodelling in asthma
- **David Anthony Barton**  The neurobiology of depressive illness: monoaminergic functions and mechanisms of cardiac risk
- **Karen Louise Berry**  The structural basis of arterial compliance and its relationship to cardiovascular outcome
- **Marco Bonollo**  Cytokine gene polymorphism in IgA glomerulonephritis
- **Melissa Jane Byrne**  The relationship between atrial arrhythmia and ventricular activity and function
- **Anna Calkin**  Effects of cardiovascular disease in diabetes
- **Felicity Meredith Chalmers**  Hypertension and control if aldosterone biosynthesis
- **Catherine Louise Cherry**  Sensory neuropathy in HIV/AIDS
- **Mark Timothy Coulson**  The effect of ischaemia on chronic renal damage in isografts and allografts
- **Stephanie Tolentino De Dios**  Effect of peroxisome proliferator activatin receptor ligands on proteoglycan biosynthesis
- **Rachel Ann Denver**  Endothelin and inflammatory cytokines in patients with chronic heart failure and other cardiovascular diseases
- **Maja Divjak**  Analysis and localisation of cytokine mRNA expression in asthmatic lung biopsies using non-radioactive in situ hybridisation (completed and passed)
- **Felicity Dunlop**  Structural and functional studies of human aldosterone synthase (CYP11B2)
• Nina Eikelis  Investigation of the biology of adipocyte, brain and cardiac leptin and of the impact of leptin on the sympathetic nervous system
• Philip John Ellery  Role of cells of the macrophage lineage as a reservoir for human immunodeficiency virus type-1 (HIV-1)
• Bryce Nathan Feltis  Inflammatory cytokines in human asthma
• Michelle Elizabeth Gahan  Development of vaccine strategies for measles and malaria using oral bacterial vectors and edible plant vaccines
• Eric Glare  Gene expression studies of inflammatory mediators in asthma (completed and passed)
• David Eugeni Godler  Role of parathyroid hormone related protein in arthritis.
• Paul Ashley Gould  Influence of electrophysiological disturbance on cardiovascular and renal performance in heart failure
• Deepak Haikerwal  Anti-adrenergic effects of amiodarone and its active metabolite N-desethylamiodarone (completed and passed)
• Karen Elizabeth Holzer  Exercise induced asthma in elite athletes
• Isabelle Yokey Yien Hoong  Functional analysis of the enzyme HSD2
• Zhong Jun Huang  Plant derived vaccines: analysis of novel delivery vehicles
• Katherine Kedzierska  Signalling pathways in human monocytes and macrophages related to phagocytosis (completed and passed)
• Karly Calliopi Koutrouvelis  Mechanisms of TRAIL action and resistance in multiple myeloma
• Mark Thomas Krawczyszyn  Ventriculo-vascular coupling in states of left ventricular hypertrophy and heart failure
• Robyn Gaye Langham  Mechanisms of progression of chronic renal disease (completed and passed)
• Robert Ken Young Lew  Potential role of oestrogens in male vasculature
• Mandy Lee Lindsay  Pathophysiological role of nerve growth factor in arthritis
• Shanhong Ling  Effects of oestrogen on the vasculature
• Renae Brook Maddison  Does differing proteolytic susceptibility determine neuronal selectivity in expanded polyglutamine tract diseases?
• Darren Robert Mansfield  Implications of sleep disordered breathing in congestive heart failure
• Caroline Marshall  Development of method for subtyping methicillin-resistant Staphylococcus aureus and its use in the understanding of epidemiology and transmission dynamics of MRSA
• Jennifer Martin  The pathophysiology of heart failure in type II diabetes
• Paul Thomas Martin  Therapeutic targeting in cardiac failure. Vasoactive factors in remodelling (completed and passed)
• Tanya Jane McWilliams  The effects of RAD on development of bronchiolitis obliterans syndrome, airway inflammation and remodelling post lung transplant
• Tanya Louise Medley  The genetic base of large artery stiffness
• Solomon Menahem  Apoptosis and its regulators in the progression of IgA nephropathy
• Anne Margaret Mijch  Predicting and preventing virological failure in HIV
• Catherine Orla Morrissey  Invasive aspergillosis: development of a decision analysis strategy for early diagnosis and improved survival in immunocompromised patients
• Judith Mary Morton  Muscle injury pre and post thoracic transplant
• Julie Nigro  Effect of lipid lowering agents on atherogenic properties of human vascular smooth muscle cells
• Melinda Maree Parnell  Arginine transport in health and cardiovascular disease (completed and passed)
• Jennifer Anne Marshall Philip  Examination of the cultural and ethical core components of palliative care
• Brindhesh Rasaratnam  Nitric oxide in the hyperdynamic circulation of cirrhosis
• Fiona Chin Pei See  The role of transforming growth factor B1 in cardiac remodelling
• Volga Tarlac  Triplet repeat expansion disorders
• Andrew John Taylor  Platelet involvement in microvascular injury in acute coronary syndromes
• Katherine Anne Thompson  The role of astrocyte dysfunction in the pathogenesis of HIV-associated dementia
• Ning Wang  Effects of fluticasone propionate on the expression of TFT-beta 1 and b in bronchoalveolar lavage fluid from stable lung transplant recipients (completed and passed)
• Helen Mary Whitford  Airway inflammation in lung transplantation
• Glen Wiesner  The sympathetic nervous system & its role in regulating obesity and thermogenesis: and their CNS control (completed and passed)
• Dharshini Wignarajah  Remodelling of vasculature and matrix proteins in inflammatory airway conditions
• Maro Ramiz-Ibrahim Williams  Pre-eclampsia - clinical and molecular studies of vascular function in changing hormonal state
• Edwina Wright  The neuropathogenesis of HIV dementia
• **Miranda Xhilaga** Characterisation of MDC chemokine in macrophages and its role in HIV-1 infection (completed and passed)

• **Ling Zheng** Airway remodelling post-lung transplant (completed and passed)

**Current Master of Biomedical Science students in the Department of Medicine at The Alfred are** –

• **Tye Dawood** Affective disorders and their association with the cardiovascular system

• **Simon Alexander Teteris** Apoptotic mechanisms of cultured renal cells

• **Yudong Wen** Effects of the inhaled corticosteroid glucocorticoid on airway inflammation in chronic obstructive pulmonary disease (COPD)

• **Dong Cheng Zhang** Apoptotic signalling and regulatory mechanisms in glomerulonephritis

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**Prominent focal and segmental glomerulosclerosis in a dual dose puromycin aminonucleoside nephropathy model.**

**Increased tubular expression of Fas in a rat model of progressive chronic renal disease.**

**Publications**

**Journals**


Glare EM, Divjak M, Bailey M and Walters EH. 'β-Actin and GAPDH housekeeping gene expression in asthmatic airways is variable and not suitable for normalising mRNA levels', (London, UK), vol.57, no.9, pp765-770, British Medical Journal Publishing Group, 0040-6376, 2002


Holzer K, Anderson SD and Douglass JA, 'Exercise in elite summer athletes: Challenges for diagnosis', *Journal of Allergy & Clinical Immunology*, (St Louis, MO, USA), vol.110, no.3, pp374-380, Mosby Inc, 0091-6749, 2002


Krum H, Roger S. Left ventricular hypertrophy in patients with chronic renal failure. *Nephrology* 2002;7:S64-S66

Krum H, McMurray JJV. Statins and chronic heart failure. Do we need a large-scale outcome trial? *J Am Coll Cardiol* 2002;39:1567-73


Lee YC, Came N, Schwarer A, Day B. Autologous peripheral blood stem cell transplantation for peripheral neuropathy secondary to monoclonal gammopathy of unknown significance. *Bone Marrow Transplantation* 2002;30: 53-56.


Mottram PL, Murray-Segal LJ, Han WR, Maguire JA and Stein-Oakley AN. 'Remission and pancreas isograft survival in recent onset diabetic NOD mice after treatment with low-dose anti-CD3 monoclonal antibodies', *Transplant Immunology,* (Amsterdam, Netherlands), vol.10, no.1, pp63-72, Elsevier Science Pty Ltd, 0966-3274, 2002

Naughton MT. 'Assessment and management of the patient presenting with snoring', *Australian Family Physician,* (Melbourne, Australia), vol.31, no.11, pp985-988, Royal Australasian College of General Practitioners, 0300-8495, 2002


Reid DW, Withers NJ, Francis L, Wilson JW and Kotsimbos TC. 'Iron Deficiency in Cystic Fibrosis', Chest, (Northbrook, IL, USA), vol.121, no.1, pp48-54, American College of Chest Physicians, 0012-3692, 2002

Romas E, Sims NA, Hards DK, Lindsay M, Quinn JW, Ryan PF, Dunstan CR, Martin TJ and Gillespie MT. 'Osteoprotegerin Reduces Osteoclast Numbers and Prevents Bone Erosion in Collagen-Induced Arthritis', American Journal of Pathology, (Bethesda, MD, USA), vol.161, pp1419-1427, American Society of Investigative Pathology Inc., 0002-9440, 2002


Woolley IJ and Boom WH., 'Viral Hepatitis', *Experts' guide to management of common infectious diseases*, (Philadelphia, PA, USA), pp176-189, American College of Physicians, 0 943 126983, J T Tan, 2002

**In Press**


Krum H, Tonkin AM. Why do Phase III trials of promising heart failure drugs often fail? The contribution of “regression to the truth”. *J Card Fail.* 2003

Liew D, Krum H. The role of aldosterone blockade in the management of systemic hypertension. *Drugs* 2003

**Book Chapter:**


**Book Review**

The Department of Medicine at Box Hill and the Australian Centre for Blood Diseases contribute to the teaching of undergraduates of the Faculty of Medicine, Nursing and Health Sciences at Box Hill Hospital, as well as conducting an extensive research program which provides opportunities for postgraduate studies.

**Research Units in the Department are** –
- Australian Centre for Blood Diseases
- The Serpins Biology Group
- The Haemostasis and Thrombosis Group
- Fibrinolysis and Gene Regulation Laboratory
- Eastern Clinical Research Unit

**Research**

**Australian Centre for Blood Diseases**

**Professor Hatem H Salem**

The basic research program of the ACBD focuses on the mechanism of blood clot formation and Professor Peter Gibson is currently leading research in a new direction, that of inflammatory bowel disease and coeliac disease. Both conditions are common diseases in our society and a better understanding of how these conditions develop will undoubtedly result in an improvement in our diagnostic capabilities and therapies.

More than forty of our scientists continue to define how blood clotting takes place and how this process is regulated. This work is of fundamental importance and should pave the way for the development of new diagnostics and treatments of blood clotting-related diseases.

The clinical research activities are an equally important component of the Centre’s operations. The use of new therapeutic agents during clinical trials gives doctors and nurses the opportunity to gain experience in advance of their general release. Furthermore the discipline imposed upon staff involved in these studies promotes a high standard of care. Patients in trials also benefit from the close supervision which is integral to this type of work.

**The Serpins Biology Group**

**Dr Paul Coughlin**

This research group continues to investigate the nature and importance of protease/inhibitor in the normal functioning of haemopoietic cells. We have demonstrated a high level expression of selected members of the serpin (serine protease inhibitor) family in both normal and leukaemic cells. Ongoing investigations are directed at demonstrating that protease regulators are essential for cell survival and characterising their behaviour during cellular activation induced by challenges from bacteria.

Other research in this laboratory involves the characterisation of the major plasma protease inhibitors in mice in an effort to understand the evolutionary forces which have driven dramatic gene duplication events in this species. We are also developing research on protease/inhibitor expression in the zebra fish, an animal which is easy to study in the laboratory. It has many functional similarities to mammals and is easy to manipulate genetically.

Hatem Salem, Paul Coughlin, Lesley Poulton and Gillian Syres discussing progress of research trials
The Haemostasis and Thrombosis Group
Dr Shaun Jackson

Platelets are specialised blood cells that play a critical role in the blood clotting process. These cells rapidly adhere to areas of blood vessel damage and undergo activation, shape change and aggregation to form a platelet plug. However, exaggeration of this response is responsible for the formation of vaso-occlusive thrombi that occur primarily in narrowed blood vessels and may result in life threatening heart attack or stroke.

The adhesion of platelets at sites of blood vessel injury is dependent upon specific interactions between platelet surface glycoproteins and vascular adhesive substrates including von Willebrand factor (vWF), collagen and fibrinogen. Two critical receptors in this process are the glycoproteins GPIb/V/IX and integrin αIIbβ3. The interaction between GPIb/V/IX and vWF is absolutely critical for the initial capture of platelets from the blood stream. Following adhesion to vWF, integrin αIIbβ3 becomes activated by an as yet poorly defined mechanism to facilitate the formation of a stable blood clot.

The research focus of this laboratory is to provide insight into the mechanism involved in the regulation of platelet adhesion and function, to identify possible targets for therapeutic intervention. To achieve these aims, we have established many state-of-the-art in vitro and in vivo assay systems to study platelet dynamics under physiological conditions of blood flow. These assay systems include the in vitro flow system designed to mimic the dynamics of blood flow as it occurs within the vascular system. This technique allows direct visualization of platelets as they interact with adhesive surfaces such as von Willebrand factor. In combination with confocal microscopy and image analysis software, it is a powerful tool for assessing important aspects of haemostasis and thrombosis under physiologically relevant flow conditions. Investigators within the laboratory have now modified the original in vitro flow system to allow direct imaging of calcium signalling inside platelets interacting with vessel wall proteins. We have also been able to study platelet aggregation under conditions of shear stress, through the development of a cone-plate viscometer, via collaborative studies with Dr Dave Dunstan of the Department of Chemical Engineering at The University of Melbourne.

In addition to the in vitro assay systems, we have developed in vivo models allowing direct visualisation of platelet adhesion and thrombus formation in damaged rat blood vessels. In combination with sensitive confocal microscope imaging techniques, this allows the behaviour and activation state of individual platelets to be monitored as they participate in various aspects of haemostasis. These models of thrombosis and haemostasis, coupled with knockout-mouse technology, will enable the laboratory to assess the importance of various enzymes/proteins in platelet function during haemostasis and thrombosis.

The platelet group has continued its exciting work with the Biotechnology Company Kinacia. This work is progressing very well, with the demonstration that several lead drugs discovered by Kinacia have very good efficacy in animal models of thrombosis. The group expects to commence clinical trials in man within the next 18 months. These major achievements promise to consolidate the research program and ensure it continues its current standing as the leading research group in Australasia for the study of blood clotting.

Fibrinolysis and Gene Regulation Laboratory
Dr Robert Medcalf

The removal of blood clots from the circulation and the turnover of extracellular matrix proteins are facilitated by specialized enzymes. One of the most important enzymes in this setting is plasmin. Plasmin performs many functions, but it is generally accepted that its primary role is to degrade fibrin, the structural scaffold of a blood clot. The generation of plasmin from its inactive precursor plasminogen is mediated by serine enzymes known as tissue-type plasminogen activator (t-PA) and urokinase (u-PA). The proteolytic activity of t-PA and u-PA is in turn regulated by specific protease inhibitors, plasminogen activator inhibitor PAI-1 and PAI-2. A specific cell surface receptor for u-PA also exists which not only provides a means of generating localised proteolytic activity in the pericellular environment, but with the help of adjacent transmembrane proteins, can transmit signals to the cell nucleus and influence the expression pattern of other genes. The plasminogen activating system also actively participates in cell movement, wound healing and the metastatic spread of cancer. Finally, in addition there is now clear evidence that the plasminogen activating system contributes to the turnover of the extracellular matrix in the central nervous system. For example, t-PA has been shown to play a role in cognitive memory, can mediate reverse occlusion plasticity of the visual cortex, and promotes neurodegeneration. Therefore, our research impacts directly into these areas of cell and neurobiology and pathophysiology.
This laboratory is interested in the molecular and cellular biology of this system. Most of our efforts are focused on the regulation of expression of its individual components at the levels of transcription, mRNA accumulation, and protein production. We have a number of projects on-going in the laboratory, most of which are focused on the molecular and cellular biology of plasminogen activation both in vivo and in vitro. We have also initiated a separate project to determine the functional consequences of the G20210A polymorphism in the human prothrombin gene.

One of the most significant achievements of this group is the discovery of a clot dissolving protein in the saliva of the Vampire bat. Work is currently in progress with the German Biotechnology company Paion which has confirmed that this protein may be a very useful treatment for patients who have suffered from a stroke. This work involves a cooperative effort with Eastern Melbourne Neurosciences under the leadership of Professor Chris Bladin.

More information on the research interests and publications of this laboratory can be found at the website: [http://www.med.monash.edu.au/medicine/box_hill/research/fibrinolysis.html](http://www.med.monash.edu.au/medicine/box_hill/research/fibrinolysis.html)

**Eastern Clinical Research Unit**  
**Cheryl Gillzan**

The Clinical Research Unit continues to take on new studies in the treatment of malignant and non-malignant blood diseases. Trials which are ongoing or have been completed recently are listed below.

- A randomised comparison of low molecular weight heparin versus oral warfarin therapy for long term anticoagulation in cancer patients with venous thromboembolism
- A multicentre, randomised, open label study comparing the efficacy and safety of once daily ORG315440/SR90107A versus adjusted-dose intravenous unfractionated heparin in the initial treatment of acute symptomatic pulmonary embolism.
- A multicentre, randomised, double-blind study comparing the efficacy and safety of once daily ORG315440/SR90107A versus twice daily enoxaparin in the initial treatment of deep vein thrombosis.
- A multicentre, randomised, double-blind study comparing the efficacy and safety of long term oral H376/95 versus twice daily subcutaneous enoxaparin followed by oral warfarin in the treatment of deep vein thrombosis.
- A multicentre, randomised, double-blind study comparing the efficacy of extended (30 day) versus standard duration (7 day) treatment with heparin pentasaccharide in prevention of venous thromboembolism in patients with hip fracture.
- A multicentre, randomised, double-blind study comparing the safety and efficacy of oral SNAC/heparin versus daily subcutaneous enoxaparin in prevention of venous thromboembolism in patients undergoing elective hip-replacement surgery.
- A prospective study of limited chemotherapy and involved field radiotherapy for patients with stage I-II Hodgkin’s lymphoma.
- A randomised, multicentre study comparing CHOP chemotherapy with or without Mabthera in patients with previously untreated diffuse large B cell non-Hodgkin’s lymphoma.
- A randomised, multicentre trial comparing CVP chemotherapy with or without Mabthera in patients with previously untreated Stage III-IV follicular non-Hodgkin’s lymphoma.

Eastern Clinical Research Unit (ECRU) continues to grow with 26 research nurses currently appointed. By far, ECRU represents the largest clinical research unit in Australia. The unit carries out clinical research in diabetes, blood clotting, cancer and neurological and respiratory diseases. Most of the studies are either advanced phase II or phase III clinical studies. Many of the drugs that have been studied in ECRU have found their way to clinical practice.

Currently ECRU has 86 active clinical trials with 25 new studies added until June 2003. Monthly more than 150 patients are screened, and 30 new patients enrolled. In addition approximately 500 patients visit the unit monthly. These are very significant statistics for a unit that has only been operational for 8 years.

ECRU has successfully established a similar unit at Maroondah Hospital. This unit is currently recruiting in several studies with a number of clinicians actively contributing. Several studies have included patients from both sites giving the Eastern Clinical Research Unit the best recruiting figures in Australia. Box Hill and Maroondah Hospitals are firmly based in the community and the Clinical Research Unit has therefore invited a number of interested General Practitioners to participate in Unit activities. This clearly improves our ability to initiate more community based studies. The Clinical Research Unit website is also ready to be launched and this
will be a valuable resource to facilitate communication between staff and allow patients and other members of the public to understand the nature and significance of our research.

The capacity of ECRU to enrol patients is very significant which makes the unit a port of first call for many pharmaceutical companies that have a study in mind. ECRU has consistently enrolled more patients than other centres in Australasia and internationally. The quality of record keeping continues to impress the pharmaceutical industry, and is another reason why the unit is continuously asked to take part in clinical programs. A recent newsletter published by a large pharmaceutical company praised the efforts of ECRU staff and highlighted the following points:

- Australia had the first study site in the World with Eastern Health Ethics Committee being the first committee in the world to approve the study
- Australia had the first clinical site in the world initiated, at Box Hill Hospital
- Australia had the first patient recruited in the world, from Box Hill Hospital
- Australia has the top recruiting site (Box Hill Hospital)

These accolades go a long way in confirming the standing of ECRU nationally and internationally.

Funding in 2002

NHMRC:
1997-2002 CJ Martin Fellowship Dr Karen Anderson
1999-2003 Project Grant, Investigation of the role of phosphoinositide 3-kinase in regulating the haemostatic function of platelets S.P. Jackson ($772,000)
2000-2002 Project Grant, Investigate the role of ectoenzymes in regulating the haemostatic function of human platelets S.P. Jackson & S.M. Dopheide ($210,000)
2000-2002 Project Grant Investigate the role of platelet von Willebrand factor in initiating platelet aggregation under flow H.H. Salem & Jackson S.P. ($300,000)
2000-2002 Regulation of tissue-type plasminogen activator gene expression in endothelial cells and in transgenic mice. Medcalf, R.L. $79,000
2000-2002 The molecular basis for the increased incidence of thrombosis associated with the prothrombin G20210A gene polymorphism. Medcalf, R.L. Carter, A. $70,000
2001-2003 Project Grant Investigation of shear-sensitive signalling pathways in human platelets S.P. Jackson and Y. Yuan ($195,000)
2001-2003 RD Wright Fellowship Dr Simone Schoenwaelder
2001-2003 Post-transcriptional regulation of the plasminogen activator inhibitor type 2 gene. Medcalf RL, Yu H. $80,000
2002-2003 Fellowship Jackson, S P Appointment – SFRB
2002-2004 Project Grant Investigation of novel mechanisms regulating platelet reactivity during haemostasis and thrombosis S.P. Jackson ($220,000)
2002-2004 Elucidation of Signalling Enzymes Regulating the Small GTPase RhoA SM Schoenwaelder ($225,000)
National Heart Foundation Grant-In-Aid
2001-2002 Investigation of the role of protein kinase C in the activation of the platelet integrin αIIbβ3 S.P. Jackson and M. Rooney ($68,000)
2001 – 2002 Investigation into the regulation and function of the small GTPase RhoA in platelets SM Schoenwaelder and HH Salem ($81,925)
2002 – 2003 A Role for RhoA in platelet integrin αIIbβ3 signalling and thrombus growth SM Schoenwaelder ($92,561)

Anti-Cancer Council of Victoria
2002-2004 Elucidation of signalling pathways that activate the small GTPase RhoA, and regulate cell adhesion and motility SM Schoenwaelder (Awarded but not accepted due to funding from NHMRC)
2002 Molecular regulation of migration in normal and neoplastic colonic cells Prof Peter Gibson $55,000

Wellcome Senior Research Fellowship
2000-2004 The role of haemoatopoietic serpins in cell growth and development P Coughlin $163,000/year

Monash University
2002 Logan Fellowship (S Schoenwaelder)

PAION GmbH
2002 To explore the effects of a serine protease from the Common Vampire Bat, Desmodus Rotundus in animal models of excitotoxic injury. Medcalf RL $120,000

Eastern Clinical Research Unit
2002 Regulation of PAI-1 gene expression in endothelial cells by roziglitazone and Pioglitazone. Dear AE, Simpson R, Medcalf RL $50,000. ECRU also received $1.3 million from Australian industry during 2002 to fund clinical trials.

During 2002 in the Department –

Several members of the basic research group were invited to present their work at International meetings. Seven individuals from the ACBD were selected from 1,000s of abstracts worldwide to present their work at the International Society of Thrombosis and Haemostasis (ISTH) Meeting in Birmingham, UK. Dr Shaun Jackson enjoyed the opportunity to present a State-of-the-Art lecture at the same meeting, as well as the American Society of Hematology (ASH) in Philadelphia. Drs Sue Cranmer and Simone Schoenwaelder, from Dr Jackson’s laboratory, were both invited to present their research at national and international meetings. Dr Cranmer presented to the International Society of Biorheology and International Society of Clinical Haemorheology Congress in Turkey, and Dr Schoenwaelder addressed ComBio2002, Darling Harbour NSW. Dr Robert Medcalf has won the right to host the next International Meeting on Fibrinolysis in Melbourne. This meeting, which is held every second year, will attract a large number of international authorities to the city of Melbourne. Robert is the President elect of the society.

Several members of the basic research program have also been the recipients of prestigious awards throughout the year. Dr Cindy Yap was awarded a Victoria Fellowship by the State Government in recognition of the significant contribution she has made to research into blood diseases.
Dr Suhasini Kulkarni, who received the Victoria Fellowship in 2001, has used her award to visit and work in numerous prominent research laboratories in the USA and UK, including Harvard Medical School, Tufts University and Cambridge University. She has now been offered a postdoctoral position at the Babraham Institute, Cambridge University UK which she will take up in 2004.

Postgraduate Opportunities

Medicine at Box Hill encourages the development of science at both an undergraduate and postgraduate level. The centre hosts dynamic postgraduate PhD and honours programmes, as well as fostering undergraduate science talent.

PhD Programme

There were 13 PhD students supervised by the Department during 2002:

- Simon Black
- Belinda Gatty
- Simon Giuliano
- Isaac Goncalves
- Anita Horvath
- Sascha Hughan
- Suhasini Kulkarni
- Mhairi Maxwell
- Nayna Mistry
- Inna Pikovski
- Mythily Sachchithananthan
- Marcus Tierney
- Cindy Li-Shen Yap

We congratulate the following students who were successfully awarded their doctorate in 2002.

- Dr Simon Black DipAppSci (Nurs) Warrnambool IAE BSc (Hons) LaTrobe
- Dr Suhasini Kulkarni
- Dr Marcus Tierney
- Dr Cindy Li-Shen Yap

Honours degree programme

An honours programme is conducted under the umbrella of several Monash University Departments; Anatomy and Cell Biology, Biochemistry, Pathology and Immunology, and Microbiology. The programme is heavily devoted to the students’ research projects, and emphasizes the importance of experimental design, data collection and analysis, literature reviews and trouble shooting. The Australian Centre for Blood Diseases has supported a large number of honours students and opportunities for studying in the laboratories at Box Hill are always available.

BG Firkin Summer Scholarship

Each year the Department of Medicine invites currently enrolled Science and Medicine undergraduates to apply for a B.G Firkin Summer Scholarship. The scholarships recognise the enormous contribution of the late Prof B.G Firkin to the fields of thrombosis and cardiovascular disease. The scholarships are designed to encourage high achieving undergraduates who wish to pursue a career in biomedical research by giving them the opportunity to participate in a research project supervised by senior research staff for six to ten weeks during their university holidays. The ‘hands on’ involvement of the students in these projects provides them with a unique chance to enhance their practical skills and to challenge them with the intellectual rigors inherent in good research. In many cases, the summer scholarships also serve as a springboard for students to undertake an Honours year within the Department.

Further information about the BG Firkin Scholarship may be obtained by contacting the Department direct.

Publications


**Patents**

Department of Pathology & Immunology

Head
Professor Ban-Hock Toh MBBS

Sing PhD DSc FRACP FRCPath

Deputy Head
Associate Professor Jennifer
Rolland BSc MPhil PhD

Personal Assistant/Secretary
Carol McCammon

Business Manager
Gillian Holley BBus (Mgt)
G Dip Acc AFAIM AHRI

Technical Services Manager
Simon Barrett BSc (Hons) PhD

IT Manager
Ian Sloan BSc PhD

Finance Officer
Helen Dinh Assoc Dip (Accct)

HR Officer
Effie Apostolou

Professional Officer
Mark Malin BSc

Technical Officers
Gloria Kiri BSc (Vet) MSc
(Microbiology)

Technical Assistants
Jade Barbuto Dip BioSc (Animal Tech)
Maree Borland
Yee-Wah (Eva) Wong BSc

Academic Staff
Professors
Michael C Berndt BSc Qld PhD
Qld Stewart Bryant MBBS FRCPA
MAACB
Mark Cooper MBBS PhD FRACP
John PG Dowling MBBS Melb
FRCPA FRCP path
James W Goding MBBS BMEdSc
MPhil Melb FRCPA
Faith Ho MBBS (Hons) Hong Kong
Dobt RCGP Lond
MRCPATH UK MD Hong Kong
FRCPA FRCP PATH FHKCPATH
FFKAM (Path)
Robyn O’Hehir BSc Lond MBBS
Lond PhD Lond FRACP FRCP
Ian Mackay AM MD FRCP
FRCPA FRCPA FAAA

Associate Professors
Richard Boyd BSc (Hons) PhD
Robert Conyers BSc (Hons) MBBS
DPhil Oscar FRCPA FAcB USA
MAACB MRACI MRACMA
Ruth Salom BMEdSc MBBS MD
FRCPA
Mark Smyth BSc PhD

Clinical Associate Professors
John H Andrew BMEdSci MBChB
Otazo FRACP FRCPA FASM
Dale Godfrey BSc (Hons) PhD
Abraham P Dorevitch MBBS Melb
MD Melb FRACP FRCPA DCP
Lond Dip Path UK FRCPA
Denys Fortune MBChB MRCP
FRCP EFRCPA FRCPA MIAC
FIAC

Tong Eng Gan MBBS FRACP
FRCPA
John A Hayman MBBS FRCPA
MD FACTM
Glenn Hocking BSc (Hons) PhD
MBBS Melb FRCPA MBA
Catariona A McLean BSc MBBS
MD FRCPA
Peter F Ryan MBBS FRACP
FAFRM
Hans-Gerhard Schneider MD
Germany AMC FRCPA FRACP
Anthony P Schwarzer MD Qld
MBBS (Hons) Qld FRACP
FRCPA
Alisson M Street MBBS (Hons)
FRACP FRCPA
Senior Lecturers
Frank Alderuccio BSc (Hons) PhD
Kevin Bendall MBBS MD Melb
FRCPA FRCPA MAACB FIAC
John Catalano MBBS FRACP
FRCPA
Siew Chin Choo MBBS Sing FRCPA
Saif-Ud-Din Chopra MBBS
DT&M &H Lond DCP Lond DPath
London FRCPA
Shen-Tou Chou
David Clouston MBBS FRCPA
Timothy Cole BSc (Hons) PhD
Merryle F Cole-Sinclair BSc
(Hons) MBBS FRACP FRCPA
Judith A Constable MBBS FRCPA
(Haem) FRCPA (Anat Path)
Leo Cussen MBBS Melb FRCPA
David Deam MBBS (Hons)
MAACB FRCPA
James CG Doery BSc MSc MD
FRCPA
William F Downey MBBS (Hons)
MRCPATH FRCPA
Michael Irriicht MBBS BSc
Paul Handley MA (Cantab)
MBCHIR FRACP FRCPA
MRACMA
Sanjata Khan BSc MBBS
MRCPATH
Jun-Ping Liu MD MSc PhD
Warren M McNaughton MB ChB
NZ FRCPA
Christine McTigue MBBS Sydney
FRCPA
Sander Monostori MD Hungary
FRCPA
Nicholas Mulvany MB BCh BAO
DCP FRCPA
Robert Payne MBBS BMEdSc
FRACP FRCPA
Salvatore Rambalbo BMEdSci
(MHs) MBBS MAACB MASM
MRACMA FRCPA
Norman Sonenberg MBBS FRCPA
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Melb
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Janet Davies BSc (Hons) PhD
John Emmins BSc GDipEd (Asian Studies) Armidale
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MRCPATH
He Li MD China PhD
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John W Sentry BSc (Hons) PhD
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Dale Godfrey BSc (Hons) PhD
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Nunzio Mancuso BSc (Hons) PhD
Cenk Suphioglu BSc (Hons) PhD
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PhD

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Maree Hamnett BSc (Hons) MSc
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Rachael Keating BSc (Hons)
Linda Kenins BSc (Hons)
Konstantinos Kyparissoudis BSc (Hons)
Zeyad Nasa BSc (Hons) MPhil
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Adnan Sali BSc
Lisa Spyroglou BSc (Hons)
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50
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Ying Cao BMed China MMedSc
China
Elizabeth Chapman BSc (Hons)
Nadine Crowe BSc (Hons)
Maria De Leon BSc (Hons)
Kate Dunster BSc (Hons)
Tamara Etto BSc (Hons)
Nirupama Eusebius BSc (Hons)
Judith Field BSc (Hons)
Leanne Gardner BSc (Hons)
Jason Gill BSc (Hons)
Ian Glaspole MBBS
Gabrielle Goldberg BSc (Biomed) (Hons)
Daniel Gray BSc (Biomed) (Hons)
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Tracy Heng BSc (Biomed) (Hons)
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Kate Ward BSc (Hons)
David Zammit BSc (Hons)
The Department of Pathology & Immunology teaches pathology to medical and science students and it teaches immunology and cell biology to science students at both the Alfred Hospital campus in Prahran and the main campus in Clayton. It runs an impressive post graduate program offering honours, masters and PhDs to science and medicine graduates. There are six research groups in the Department, each led by a senior member of our academic staff.

*Research Units in the Department are –*
- Allergy Research Laboratory
- Autoimmunity and Molecular Immunopathology Laboratory
- Molecular Signalling Laboratory
- Cell Biology and Immunoochemistry Laboratory
- Lymphostromal and Immune-Reconstitution Laboratory
- T Cell Laboratory

**Research**

**Allergy Research Laboratory**  
Professor Robyn O’Hehir (Allergy and Clinical Immunology/Pathology and Immunology)  
Assoc Professor Jennifer Rolland (Pathology and Immunology)

Australia has one of the highest rates of allergic disease in the world with over 30% of individuals suffering from allergic diseases including rhinitis and asthma. Strategies for defining critical allergens in the allergic immune response with resultant improved diagnostic tests, novel treatment regimens and assays to monitor clinical efficacy will significantly reduce the burden of allergy. Allergen-specific immunotherapy offers the advantages of antigen specificity and the chance of a cure, unlike mainstream drug treatments that counter allergic inflammatory mediators and their effects. However, efficacy of immunotherapy varies from 60-80% with grass pollens and house dust mites, but for allergens of high anaphylactic potential such as latex or peanut no suitable preparations are available. Clinically successful immunotherapy is associated with a shift from IL-4 dominant allergen-specific T cells (Th2-type) to IFN-γ dominant (Th1-type) cytokine production with the induction of T regulatory populations (IL-10). We are developing preparations of latex, peanut, house dust mite and grass pollen allergens which specifically target the allergen-specific T cell to increase efficacy of immunotherapy. These preparations will also be selected for lack of IgE binding epitopes to ensure safety. Additionally we are exploring mechanisms of effective immunomodulation and the role of dendritic cells. There is significant commercial potential in the area of vaccines and laboratory assays for allergy.

**Research outcomes**
- Established mouse model of latex allergy
- Identified and patented dominant T cell reactive sites of latex glove allergens
- Established an in vitro model of allergen immunotherapy
- Established whole blood basophil activation assay for detection of clinically relevant allergens and to evaluate safety of vaccine candidates for immunotherapy.

*Robyn O’Hehir and Jenny Rolland discuss findings of the Allergy laboratory*
Autoimmunity and Molecular Immunopathology Laboratory  
Professor Ban-Hock Toh  
Dr Frank Alderuccio

Aims of this laboratory

1. To better understand the pathogenesis associated with organ-specific autoimmunity with autoimmune gastritis as a model
2. To define strategies aimed at reversing autoimmune disease
3. To develop diagnostic immunoassays
4. To apply autoantibodies as probes for molecular cell biology

Pathogenesis of autoimmune gastritis

Our studies with autoimmune gastritis have focused on the experimental mouse model that closely resembles human autoimmune gastritis. Our previous studies have shown that autoimmune gastritis is initiated by an autoimmune response to gastric H/K ATPase β-subunit (Reviewed in Alderuccio et al, 2002, Toh et al, 2002). We have previously shown that mucosal cellular destruction associated with autoimmune gastritis is by the process of apoptosis (Judd 1999). Using gene knock-out mice, we have examined the roles of Fas and TNF pathways in autoimmune gastritis. We showed that Fas has a major role in mucosal cell death (Marshall et al, 2002). In contrast, we found that absence of signalling through TNF receptors did not alter the course of gastritis (Marshall et al, submitted for publication). Chemokines are signalling molecules and signalling through the chemokine receptor CCR5 on T cells has been reported to be important in rheumatoid arthritis. However, using gene-knockout mice deficient in CCR5, we have shown that the absence of this chemokine receptor is not critical for initiation of experimental autoimmune gastritis (Field, et al, submitted for publication).

Reversing autoimmunity

Our strategies to induce immunological tolerance in autoimmune diseases evolved from our earlier findings that transgenic expression of gastric H/K ATPase β-subunit in the thymus rendered the mice tolerant and resistant to disease (Alderuccio et al, 1993). We have extended these studies to determining whether transfer of bone marrow from resistant transgenic mice expressing autoantigen can render recipient mice tolerant. Preliminary studies have been promising (Murphy et al, 2003). We expect this strategy will be applicable to other autoimmune disease models (Alderuccio et al, 2003).

Immunoochemistry Laboratory  
Professor James W. Goding

This laboratory is devoted to the understanding of metabolic control mechanisms at the molecular level, particularly the control of bone calcification and body weight.

Over many years we have studied ecto-nucleotide pyrophosphatase/phosphodiesterase, also known as the plasma cell membrane glycoprotein PC-1, which cleaves extracellular ATP to generate AMP and pyrophosphate. Extracellular AMP can in turn be converted to adenosine by the ubiquitous 5’ nucleotidase. Each of these products is metabolically active. ATP, AMP and adenosine can act on purinergic receptors and hence influence cellular activity. PC-1 is also the major source of extracellular pyrophosphate, which is a potent inhibitor of formation of hydroxyapatite, the main component of bone. We have shown that this enzyme is a key regulator of calcification of bone and other tissues, and failure to produce the right amount of PC-1 leads to arthritis and osteoporosis. In collaboration with Pfizer, we are using high throughput screening to seek drugs that inhibit the enzyme. Such drugs might be useful in treating some forms of arthritis. We are also working towards solving its structure at the atomic level by X-ray crystallography.

Leptin is a newly discovered hormone that controls appetite and body weight. We have used genetic engineering to express human, mouse and sheep leptin in bacteria, and developed ways to refold and purify leptin so that it is fully active. Previous work on leptin in animal models has concentrated on mice, which differ from humans in many ways. In collaboration with Professor Iain Clarke of Prince Henry’s Institute, Melbourne, we have embarked on a series of experiments on the role of leptin in control of body weight in sheep. Sheep have many advantages as an experimental model for weight control, because they have a closer resemblance to humans in the way in which hormones control body weight. We have shown that sensitivity to leptin differs in males and females, and varies depending on the time of year.

It is widely believed that the immune system can fight cancer. If this concept could be shown to be true, it would suggest new ways to attack cancer via the immune system. However, despite intensive study over many years by many laboratories, it has been very difficult to identify and isolate such tumour antigens. In a project funded by CancerProbe, we are approaching this problem in a novel way, by focussing our attention on the
lymph nodes that drain the tumour. This is possible because the local lymph nodes are often removed during surgery. We are culturing cells from lymph nodes from patients with breast cancer, and examining whether they secrete antibodies that are specific for the tumour. This work is technically demanding, but if successful, could lead to improved and novel forms of diagnosis and treatment of cancer.

**Lymphostromal and Immune-Reconstitution Laboratory**

**Assoc Professor Richard Boyd**

The development and maintenance of the central cells of the immune system – T and B lymphocytes is critically dependent on the structural integrity of the thymus and bone marrow. Failures in these processes are highly predictive of the development of a wide range of life threatening diseases including immunodeficiency, cancer and autoimmunity.

The ability to manipulate the cellular contents and genetic make-up through gene therapy of haemopoietic stem cells of these organs, particularly the thymus, also provides a powerful means of approaching the clinical management of conditions such as bone marrow (haemopoietic stem cells) and organ transplantation, allergies, asthma, and severe infections including AIDS.

One of the unusual features of the immune system is that it is under the direct control of steroids. The thymus in particular undergoes profound anergy under the influence of sex steroids such that post-puberty it reduces its functional capacity to less than 5% of the young thymus. In normal circumstances this does not represent a major problem but with aging there is a marked increase in disease states such as cancer, autoimmunity and generalised immunodeficiency. Furthermore in conditions where there is a major loss of T cells such as HIV/AIDS or following chemotherapy or radiation therapy, in the adult there is no facility to regenerate the T cell pool. The relationship of age to recovery of T cell function has been clearly demonstrated in humans where cell mediated immunity in young children is evident within weeks of treatment and is generally fully recovered by two months. In older people, where the thymus has undergone severe atrophy, the recovery of cell mediated immunity following T cell depletion can be very slow and can take up to 1-2 years.

The ability to regenerate the thymus represents one of the major challenges of modern medicine. We have initiated these studies and have been successful in totally rejuvenating thymic function and hence the peripheral T cell pool. We have also undertaken successful clinical trials in this area. There are several potential honours projects possible in this area including pre-clinical studies on the mechanisms of thymic growth at the cellular and molecular levels, focusing on stem cell based research, identification of the genes and proteins involved with thymic function and regrowth, the evaluation and monitoring of clinical trials, the development of new applications of this treatment and the interaction with the commercial world.

To address these issues, this laboratory has focused for many years on the cellular and molecular basis to thymus development and function and hence the production of T Lymphocytes and their incorporation into the peripheral T cell pool. Very recently we have identified a population of thymic epithelial cell progenitor cells which when transferred into an athymic host, can form into a complete thymus organ. We utilise an extensive range of the most recent materials and technologies and have an impressive national and international collaborative network. The laboratory has a long history of excellent Honours, MSc and PhD students and is very well funded including strong commercial links supporting not only the basic research but also several clinical trials on thymic regeneration in immunodeficiency states.

Victorian Premier, Steve Bracks and Minister for Innovation, Industry and Regional Development, John Brumby, paid a surprise visit to the Boyd Laboratory. Pictured here with Bernie Romanin and Peter Simpson of Norwood Abbey Ltd, lab staff Jayne Sutherland and Mark Malin, and PhD student Jason Gill.
T cell laboratory  
Dr Dale I Godfrey

An important corollary of the observations of this laboratory is that NKT cell numbers are a significant factor in determining the outcome of some diseases, and NKT cell numbers are controlled by the production of these cells in the thymus. Dr Godfrey’s laboratory has also been studying how NKT cells develop in the thymus, with the goal of understanding this process in enough detail to identify molecular targets that may ultimately allow us to regulate NKT cell numbers in the clinical setting. A key step in this direction has been the elucidation of a developmental pathway for NKT cells, showing that they pass through defined, phenotypically and functionally distinct stages as they mature, and that they migrate from the thymus to peripheral tissues prior to reaching full maturity. The research has also shown that NKT cells are susceptible to intrathymic selection events, akin to those that shape the repertoire of conventional T cells.

Molecular Signalling Laboratory  
Dr Jun-Ping Liu

This laboratory studies aspects of intracellular signalling pathways that regulate cell lifespan and cell secretion and uptake. When errors are generated from these pathways, cells can become either early ageing or immortal as seen in cancer. For nerve cells, altered cellular secretion may underlie neural degenerative diseases such as Alzheimer’s disease.

To reveal the fundamental mechanisms controlling cancer cell lifespan and altered neurotransmission, we focus on several key proteins that are indispensable and pivotal in mediating these essential cellular activities. These molecules include the enzyme telomerase, a novel brain-specific ATPase, and their respective regulatory proteins.

Telomerase is a key enzyme that extends cell life spans. It works on telomeres, the ends of chromosomes, and protects telomeres from being shortened and damaged in cancer. Protection of telomeres may thus pave a fundamental pathway for long life spans, whereas selective inhibition of telomerase may provide a powerful mechanism in anti-cancer therapy.

By studying the protein dynamin that mediates cellular uptake and secretion, we recently cloned a new ATPase. This new ATPase is expressed only at the Golgi of specialised secretory cells such as neurons, endocrine and exocrine cells. Further investigation of this ATPase would reveal exciting new aspects in brain function.

Research Funding in 2002

ARC project grant received by Dr Jun-Ping Liu $56,287

NHMRC Project Grants received by:
1. Professor Ban-Hock Toh and Dr Frank Alderuccio $100,561
2. Professor Ban-Hock Toh and Professor H.K Muller $10,000
3. Dr Dale Godfrey $80,000
4. Dr Dale Godfrey, Dr Timothy Cole and Associate Professor Richard Boyd $135,000
5. Dr Dale Godfrey and Associate Professor Richard Boyd $106,330
6. Associate Professor Richard Boyd $96,621
7. Associate Professor Richard Boyd and Dr Ann Chidgey $75,828
8. Professor Robyn O’Hehir $68,580
9. Professor Robyn O’Hehir $135,660
10. Dr Cenk Suphioglu $76,479

NHMRC Postgraduate Research Scholarship awarded to Frank Lai $9,528

NHMRC Dora Lush Biomedical Postgraduate Scholarship awarded to Deanne Greenwood $19,214 including $1,070 for maintenance and travel

NHMRC Senior Research Fellowship, Level B, awarded to Dr Dale Godfrey $105,000

Alfred Hospital Postgraduate Research Scholarship awarded to Ian Glaspole $10,184

The Alfred Research Trust awarded the Department $30,000.

Gribbles Pathology donated $20,000 to the Department.

Elitek (Stronghold) donated $100,000 to Dr Jun-Ping Liu’s research.
The Monash University Research Fund (MURF) provided a Travel Grant of $4,000 to Dawei Xu to visit the Molecular Signalling Laboratory from Sweden.

CRC for Asthma granted $625,686 to Professor Robyn O’Hehir, Dr Jo Douglass, Dr Frank Thien and Associate Professor Jennifer Rolland.

CancerProbe Pty Ltd funded $68,791 and Pfizer Inc $129,154 to Professor Jim Goding’s research.

Immuno Concepts provided $69,735 towards the cost of Professor Ban-Hock Toh’s research.

Norwood Abbey contributed $1,000,000 to Associate Professor Richard Boyd’s laboratory.

**Special achievements during 2002**–

**Dr Dale Godfrey Associate Professorial Fellow**
NHMRC Senior Research Fellowship Level B
Monash University Medical Faculty - Silver Jubilee Research Prize 2002
Awarded an NHMRC Program Grant, as part of a team of 4 Chief Investigators

**Jason Gill PhD Student**
NHMRC CJ Martin Fellowship
First author in a paper published in Nature Immunology.

**Jared Purton PhD Student**
Victorian Premier’s Commendation for Excellence in Medical Research Mollie Hollman medal

**Nadine Crowe PhD Student**
Australasian Society for Immunology International Travel Bursary

**Leanne Gardner PhD Student**
Poster Prize – Australasian Society for Clinical Immunology and Allergy annual scientific meeting, September 2002
Poster Prize – CRC for Asthma for house dust mite immunomodulation project

**Ian Glaspole PhD Student**
CRC for Asthma prize for best oral presentation for peanut cross reactivity study

**Judith Field PhD Student**
Student Prize for Oral Presentation at the 10th Conference of the Immunology Group of Victoria, 6-8th of October 2002.
Title of Presentation: “Chemokine Receptor CCR5 is not essential in the Development of Experimental Autoimmune Gastritis.

**Aiden Marshall PhD Student**
Alfred Research Week Poster Display, 11-15th of November 2002
Whole Time Medical Specialist’s Private Practice Scheme Prize recipient for “Best Basic/Laboratory Section Poster”

**Janet Davies Senior Research Fellow**
Grant success NHMRC, Grape and Wine Research Board, Alfred Trusts, Monash Research Fellowship

Charles Hardy Senior Research Fellow
Poster Prize - Alfred Research Week, November 2002

Charles Hardy Senior Research Fellow and Linda Kenins Research Assistant
Alfred Research Week poster prize for mouse model of latex allergy

Allergy Research Laboratory
Recognised international research strength of Monash University

Department of Pathology and Immunology
Recognised international research strength of Monash University

Teaching

The Department of Pathology and Immunology teaches the TINI (Tissue injury, neoplasia and inflammation) course in Year 2 of the present 6 year curriculum of the MBBS, and also the Laboratory Medicine course in Year 4. Pathology and Immunology is also taught in Infection and Immunity (Yr 2) and in the weekly clinicopathological conferences and autopsy demonstrations at both the Alfred and the Monash Medical Centre. Elective studies including B.Biomed.Sci (Hons) for medical students are also encouraged.

The Department also teaches thirteen subjects for Bachelor of Science or Bachelor of Biomedical Science students, as well as subjects in the Bachelor of Nutrition and Dietetics and Bachelor of Radiography and Medical Imaging courses. These subjects provide an excellent coverage of all aspects of Immunology and students will be well equipped to undertake a career in research, applied or diagnostic Immunology.

PhD Opportunities

The Department of Pathology and Immunology has a vibrant post-graduate research program that provides a stable and structured environment for students to develop their research careers. Students are exposed to world class research in basic and clinical immunology, allergy, cell biology, pathology and cancer research. In addition, the department has many links with other institutes and departments that enhances these studies and nurtures collaborative efforts. The department has a base of 30-35 post-graduate students who also contribute to the scientific community by presentations at national and international conferences and publications in highly ranked journals.

Our current PhD students are:

- **Ilia Banakh** Biology of ecto-nucleotide pyrophosphatase/phosphodiesterase
- **Mark Biondo** Autoimmune gastritis in PC-GMCSF transgenic mice
- **Ying Cao** Studies of telomerase in cell survival and proliferation
- **Elizabeth Chapman** The molecular basis of the reversal of thymic atrophy
- **Nadine Crowe** The role for NKT cells in tumour immunity
- **Maria De Leon** Immunological and molecular characterisation of major peanut allergens and their cross-reactive components in tree nuts
- **Tamara Etto** Generation of antigen specific T cell lines using polymorphic antigenic proteins and dendritic cells
- **Judith Field** Experimental autoimmune gastritis: Mechanisms of induction and therapeutic strategies
- **Leanne Gardner** Modulation of the allergen-specific T cell response
- **Jason Gill** Development of the thymic epithelium
- **Ian Glaspole** The human cellular response to the major allergens of the peanut, *Arachis hypogoea*
- **Gabrielle Goldberg** Alteration of sex steroid concentrations as a means to reverse immune deficiency states
- **Daniel Gray** Cellular and molecular biology of thymic stromal cells
- **Deanne Greenwood** Cell division
- **Rachael Keating** Activation of T and NKT cells in normal and HSV-1 infected mice
- **Pui Ling (Frank) Lai** Studies of the function of EEAI in genetically manipulated models
- **Douglas Liddicoat** Analysis of the effect of glucocorticoids on T cell development and peripheral function
- **Jessica Markby** The distinct roles of perforin in mediating anti-tumour cytotoxicity and lymphocyte homeostasis
- **Aiden Marshall** Pathogenesis of experimental autoimmune gastritis
- **Morag Milton** Cell surface proteins involved in T-cell development in the thymus
• Jared Purton An investigation of factors for involvement in T cell development
• Shayna Street NK cell effector mechanisms in tumour surveillance
• Michael Sutherland The human cellular and humoral immune response to the latex allergen Hev b 5
• Adam Uldrich The functional status of recent thymic emigrants
• Catherine Van Vliet Characterisation of a family of Golgi-localised coiled coil peripheral membrane proteins
• Kate Ward Polymorphic minor histocompatibility antigens and dendritic cells: A method for generating a potent graft-versus-leukaemia effect for use in immunotherapy
• David Zammitt Characterisation of mice rendered Thymic Shared Antigen 1 deficient by gene targeting

Our current Masters students are:

• Katrina Dunster Characterization of autoantigens implicated in protein trafficking
• Darren Ellemor The effects of bacterial toxins on inflammation and cell migration
• Nirupama Eusebius The human T cell response to isoforms of the major Bermuda grass pollen allergen, Cyn d1
• Ling Guo Studies of cardiomyocyte survival and apoptosis: Roles of telomerase and telomere
• Shu Ping (Tracy) Heng Kinetics and functional studies of thymic and T cell regeneration following castration
• Kim Murphy Can genetically modified bone marrow cure experimental autoimmune gastritis?
• Samy Sakkal Evaluation of putative thymic epithelial progenitor cells defined by MTS24

Higher Degree Students who graduated in 2002

Congratulations go to the following students who were award Doctor of Philosophy during 2002:
Matthew Damian Burton
Kirsten Jenna Louise Hammond
Ming Li
Jayne Suzanne Sutherland

The following students were awarded the degree of Master of Science through the Department of Pathology and Immunology:
Maree Vanessa Hammett BSc (Hons)
Lina Papalia BSc (Hons)

The following students graduated in 2002 after completing honours in the Department:
Rula Azzam BSc Honours
Louise Campano BSc Honours
Elizabeth Chapman BSc Honours
Judith Field BSc Honours
Konstantinos Kyparissoudis BBioMedSc Hons
Lynley Moore BSc Honours
Kim Murphy BSc Honours
Amanda-Jane Ruth BSc Honours
Samy Sakkal BSc Honours
Lisa Spyroglou BSc Honours
Angela Young BSc Honours

Publications - Journals


Mackay IR and Toh BH. Autoimmune hepatitis: the way we were, the way we are today and the way we hope to be. *Autoimmunity* (2002) 35 (5), 293-305.


Mitakakis TZ, Tovey ER, Yates DH, Toelle BG, Johnson A, Sutherland MF, O’Hehir RE and Marks GB. Particulate masks and non-powdered gloves reduce latex allergen inhaled by healthcare workers. *Clinical and Experimental Allergy* (2002) 32 (8), 1166-1169.


Sutherland MF, Drew A, Rolland JM, Slater JE, Suphioglu C and O’Hehir RE. Specific monoclonal antibodies and human immunoglobulin e show that Hev b 5 is an abundant allergen in high protein powdered latex gloves. *Clinical and Experimental Allergy* (2002) 32 (4), 583-589.


**Publications - Book chapters**


Department of Surgery at The Alfred

Head
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Personal Assistant/Admin Officer
Kathryn F Noble

Business Manager
Gillian Holley BBus (Mgt) GDipAcc

Technical Services Manager
Simon P Barrett BSc (Hons) PhD

IT Manager
Ian G Sloan BSc (Hons) PhD

Finance Officer
Helen Dinh Assoc Dip (Acc)

HR Officer
Effie Apostolou

Administration Officer
Jo-An Giovannoni AssocDip Office Mgt

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Michael J Grigg MBBS FRACS
Thomas Kossmann MD Heidelberg FRACS
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Alan Rodger BSc MBChB Edin DMRT FRCSE FRCS

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Clinical Associate Professors
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Adel FRACP FFARACS FANZCA FFICANZCA
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John Hart MBBS FRACS FAOrthA
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M Cristina Morganti-Kossmann PhD Rome
Salvatore Pepe BSc PhD
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Adrian Pick MBBS FRACS FRACS
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Cabrini
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Clinical Dean Cabrini
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W J Lyon
Graham D McCrystal
Francis J Miller
Mehrdad Nikfarjam
Olivier WV van den Brink

Post Graduate Students

John Laidlaw MBBS FRACS

Post Graduates

W J Lyon
Graham D McCrystal
Francis J Miller
Mehrdad Nikfarjam
Olivier WV van den Brink
The Department of Surgery at The Alfred Hospital is the coordinating centre for the surgical undergraduate teaching program within the Central and Eastern Clinical School. Other sites include Box Hill Hospital (Professor Michael Grigg), Cabrini Hospital (Professor Adrian Polglase) and the rural surgery program supervised by Mr David Birks at Latrobe Valley.

The Department currently has 86 clinical members including paid and honorary academics who are involved in the teaching of students in the surgery program. The department contributes to undergraduate teaching of the six year curriculum principally in years 4, 5 and 6. The new 5 year curriculum commenced in 2002, with the first major contact of students with the Alfred Hospital to commence in 2004.

The Department also contributes significantly to postgraduate clinical and research training, clinical service and audit and quality assurance processes.

**Current research programs of the Department include –**

- Obesity
- Keratinocyte and Chondrocyte Cell Culture
- Gastrointestinal Function and Disease
- Treatment of Liver Metastases
- Healing of Chronic Gastric Ulcer
- The Artificial Bowel Sphincter in Anal Incontinence
- Trauma Research
- Neurosurgery Research
- Radiotherapy Research
- Cardiovascular Research

**Obesity – the Disease and its Treatment**

*Professor Paul O’Brien*

This has now become the major research area of the Department. Obesity is a common and growing problem, it generates more disease than any other single pathogen and it can now be treated safely and effectively. Through the extensive clinical use of the Lap-Band procedure, the department is now the world leader in research into the health benefits of weight loss.

The areas of study which we are undertaking include:-

1. **The Problems of Obesity and the Benefits of Weight Loss on** -
   - Type 2 diabetes – ongoing randomised control trial
   - The diseases of the metabolic syndrome – insulin resistance; hyperlipidaemia; hypertension; steatohepatitis; polycystic ovary syndrome
   - Increased risk of cardiovascular events
   - Obstructive sleep apnoea and sleep disordered breathing
   - Asthma
   - Gastro oesophageal reflux disease
   - Gallstones
   - Urinary incontinence
   - Osteoarthritis
   - Low back pain
   - Depression
   - Obstetric complications
   - In general, we have completed most of the observational studies in these areas and are now moving to the use of RCT format as the defining studies wherever possible.

2. **Optimising the technique of Lap-Band placement and follow-up care** -
   - Pars flaccida versus perigastric – ongoing randomised controlled trial
   - The eating and exercise rules after Lap-Band
   - Optimising the adjustment schedule
   - Anaesthesia in the morbidly obese
   - The assessment of obesity – clinical, laboratory, special techniques

3. **Optimal treatment for the obese** -
   - Medical or surgical treatment – ongoing randomised controlled trial
   - The obese adolescent – randomised controlled trial commencing soon
   - Eating behaviour and outcomes
   - Levels of obesity and outcomes
   - Predicting outcomes after treatment
4. Endoscopic treatments for obesity -
   Intragastric balloon
   RF energy – induced gastric reduction
5. Mechanisms of satiety/appetite
   Clinical/laboratory studies of ghrelin, leptin, insulin and other candidate hormones
6. Quality of Life -
   Changes in validated QOL measures with weight loss
   Appearance orientation/evaluation

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**Keratinocyte and Chondrocyte Cell Culture**
**Ms Joanne Paddle-Ledinek**

The patterns of growth of keratinocytes in tissue culture and the influence of growth factors and of electrical and magnetic fields are being investigated. These techniques will help in the current clinical application of keratinocyte grafts for the patient with severe burns.

Chondrocytes are being grown in the laboratory and applied to defects in the articular cartilage in the knee joint. The laboratory techniques and clinical outcomes in these patients are being evaluated.

The cell culture laboratory is now accredited by the Therapeutics Goods Administration Act for preparation of cell cultures for routine clinical care. Keratinocyte cultures and chondrocyte cultures are provided as a commercial service to surgeons across Australia.

The specific research studies include:-
- The effect of electric/magnetic fields on the healing rate of skin wounds
- Autologous chondrocytes for clinical research into the repair of articular cartilage in traumatised joints
- Mechanisms of the effects of estrogens on cell proliferation: ER dependent and ER-independent pathways. Collaborative work, study underway
- Development of urothelial cell culture and its use in bladder reconstruction - collaborative work with Professor PA Dewan at the Royal Childrens’ Hospital.

**Gastrointestinal Function and Disease**
**Mr Stewart Skinner**

We are studying the development of colon cancer looking for methods of prevention, particularly using non-steroidal anti-inflammatory drugs. Areas of study include the quantitation of effectiveness of various drugs,
characterisation of their effect on aberrant crypt foci, polyps and cancers, mechanisms of action, particularly via possible cyclo-oxygenase and non-cyclo-oxygenase pathways.

Specific studies of mechanisms include measurements of COX-1 and COX-2 mRNA in different settings and the role of β-catenin as a central path for NSAID effect. The inter-relationship between the use of these drugs and growth patterns, and rate of cell death in the cancer being studied, have been linked with the expression of oncogenes in the tumour cells.

In parallel with these studies we are examining the patterns of injury and repair in the gastric mucosa, particularly relating to the effect of NSAIDs which, while capable of preventing colon cancer, have a parallel capacity to injure the gastric mucosa.

There is an urgent need to identify precursors or markers of malignancy in the colon so that earlier diagnosis and treatment can be achieved. We have a particular interest in the Aberrant Crypt Foci (ACFs) in the human colon as a marker for cancer. The study of ACFs involves both animal and human study and includes the following:-

- Determination of the incidence of ACFs in the human colon
- Determination of the histological characteristics of ACFs
- Determination of immunohistological characteristics of ACFs
- Development of endoscope for detecting and counting ACFs
- Trials of drug effects on ACF numbers
- Use of confocal fluorescence microscopy for rapid identification of human colorectal status.

Treatment of Liver Metastases
Associate Professor Chris Christophi

A series of human and animal studies are being conducted to identify optimal management of colorectal metastases to the liver. These studies represent an example of the best collaboration between hospital and university, between clinical practice and clinical research and between clinical and laboratory research.

Specific research studies include:-

- ILH in the treatment of unresectable CRC liver metastases
- Defining optimal setting for the use of diffuser fibre tip for the laser treatment of liver tumours
- Characterising the evolution of tumour destruction following application of interstitial laser hyperthermia
- Interstitial laser hyperthermia in colorectal liver metastases: the use of thermal sensitisation
- Colorectal liver metastasis: comparison of focal hyperthermia versus surgical resection in an animal model
- Thalidomide: angiogenesis inhibition of colorectal liver metastases
- Hyperbaric oxygen therapy in severe acute pancreatitis
- Hyperbaric oxygen therapy in severe acute pancreatitis – rat model
- Effect of CA4P on ILH: a study to see if tumour destruction at the host-tumour interface can be maximised with the use of CA4P
- Tumour cell proliferation and apoptosis following SMANCS/Lipiodol
- The expression of growth factors and cell cycle regulatory genes following SMANCS/Lipiodol
- The effect of SMANCS/lipiodol on gene expression in tumours
- Microvasculature of liver metastases: a scanning electron microscopic study
- Effect of CA4P on tumour growth and microvasculature in liver metastases
• Growth inhibitory mechanisms of liver metastases by CA4P-cell proliferation and apoptosis
• Effect of CA4P on growth factors and their receptors, tumour suppressor genes and oncogenes in colorectal liver metastases
• Gene expression in tumours during treatment with CA4P

Healing of Chronic Gastric Ulcer
Professor Paul O’Brien

The individual components of ulcer healing, particularly the proliferation of epithelium, contraction of the wound, and changes in the extracellular matrix are measured, and the influence of NSAIDs, of prostaglandins and of aging on these various processes are being studied using an experimental model of chronic ulceration. Techniques include quantitative histology, immunohistochemistry and radioimmunoassay.

Specific research studies include:-
• Effect of both COX-1 and COX-2 inhibitors on ulcer healing
• Angiogenesis in ulcer healing
• Wound healing in vitro studies
• Apoptosis in regenerative mucosa after NSAID treatment
• Effect of COX-2 inhibitors on ulcer healing in the aged
• Myofibroblasts and COX-2 inhibitors
• COX-2 mRNA localisation by in-situ hybridisation

The Artificial Bowel Sphincter in Anal Incontinence
Professor Paul O’Brien

The artificial bowel sphincter provides the potential for effective control of severe faecal incontinence. Clinical studies have been conducted to characterise the effectiveness, side effects and technical aspects of its use.

The Department has been awarded a grant through the Department of Health and Aged Care to conduct a randomised controlled clinical trial to compare, using a prospective randomised control trial format, the relative effectiveness and costs of standard supportive therapy and placement of an artificial bowel sphincter. Outcome measures which will be made at three and six months after entry into the study will include standardised measures of continence, measures of quality of life, and the costs and complications of therapy.

Funding in 2002

John Dixon. Lap band Studies $25,000 Tyco Healthcare.


Stewart Skinner. Colon Study. $30,000. Optiscan. Project grant.

Mehrdad Nikfarjam. The effect of thalidomide on the induction and growth of colorectal liver metastases. $20,000 Royal Australasian College of Surgeons. Project grant.

Mehrdad Nikfarjam. Treatment of colorectal liver metastases by laser hyperthermia. $42,000 Royal Australasian College of Surgeons. Scholarship.


Stewart Skinner. A new screening technique for colorectal cancer using the Optiscan Endomicroscope. $18,000 Jack Brockoff Foundation. Project grant.


Paul O’Brien & Stewart Skinner. Identification of aberrant crypt foci (ACFs) in human mucosa using the Optiscan Endomicroscope. $60,000  Optiscan.

Jamie Cooper. $84,410  NHMRC Project grant.

W J Lyon $1452  NHMRC Scholarship.

During 2002 the Department –

Many significant events occurred during the year 2002. Most notable was Professor Jeffrey Rosenfeld being named Victorian of the Year. There were also the appointments of the Department’s Associate Professor Chris Christophi to the University of Melbourne Chair of Surgery at the Austin Hospital, and Gillian Duchesne to the University of Melbourne Chair of Radiation Oncology at the Peter Mac.

Graduations during 2002

PhD
John Dixon MBBS Dip RACOG FRACGP. Changes in obesity related disease with weight loss.
Debbie Mantzaris BSc. Investigations of mechanisms involved in delayed gastric ulcer healing by nonsteroidal anti-inflammatory drugs (NSAIDs).
Vijayaragavan Muralidharan MBBS. Treatment of colorectal liver metastasis by laser induced hyperthermia.

John Dixon completed his PhD and commenced as a Research Fellow in obesity studies during the year.

PhD students in the Department of Medicine at The Alfred during 2002 –
- John B Dixon The effect of weight loss on the co-morbidities of morbidly obese
- Graham D McCrystal Optimal organ preservation strategies for cardiac transplants: protecting the coronary vasculature.
- Francis J Miller Dysfunction in the senescent myocardium in cardiac surgery
- Mehrdad Nikfarjam Treatment of liver tumours
- Olivier WV van den Brink Novel role of cardiac opioids in ischemia-reperfusion, heart failure and cardiac surgery.

Publications
Journals


Dixon JB, O'Brien PE. Wine consumers have reduced cardiovascular risk through improved insulin sensitivity and reduced plasma homocysteine. *Australian Grapegrower and Winemaker* October 2002


Clinical School

Directors of Academic Programs
Laila Rotstein MBBS Melb FRACP
Morry Silberstein MBBS (Hons) MD Melb DRACR FRANZCR

Personal Assistant
Judy Hall
Administration Manager
Lawrence Hudson
Clinical Supervisor
Simon Frenkel MBBS

The Clinical School comprises divisions located at The Alfred Hospital, Box Hill Hospital, St F.X. Cabrini Private Hospital and Maroondah Hospital. The Alfred Clinical School was established in the first decade of the 20th century as a teaching hospital for the University of Melbourne, but with the commencement of Monash University’s medical degree in the early 1960s, The Alfred became the first teaching hospital for the new medical school. With the restructuring of the Faculty of Medicine in 2000, the Clinical School at The Alfred became a formal division of the Central and Eastern Clinical School and took responsibility for management of the clinical schools at Box Hill, Cabrini and Maroondah.

Highlights of 2002

• In partnership with the Southern Clinical School at Monash Medical Centre, this School completed the first trainee internship program of “selectives” or “advanced clinical practice units” within an Australian medical school. Final year MB BS students commenced direct, although still supervised, responsibility for patient care. This novel program was piloted in 2001 with a small number of students, and the outstanding feedback resulted in the formal establishment of trainee internships at The Alfred and Box Hill Hospitals in 2002. All trainee interns at CECS teaching hospitals satisfactorily completed their terms in 2002, and feedback – both from students and supervisors – was uniformly positive.

• For the first time the School direct supervised comprehensive clinical examinations in “OSCE” format to 5th year undergraduate students in June and November. Previously, limited examinations in Medicine and Surgery had been administered by the individual Departments, but the responsibility was devolved to this Office in 2002. In addition, the School hosted 5th year examinations in Obstetrics and Gynaecology and Paediatrics. All examinations were delivered satisfactorily, a tribute to the hard work of this Office’s staff and in particular, the Clinical Supervisor.

• Over 30 international elective students were supervised. They spent between 2 weeks and 3 months attached to The Alfred and came from as far away as Austria and Zaire. The School and the Hospital benefit from the diverse cultural backgrounds of these international visitors.

Teaching

The Clinical School delivered undergraduate MB BS teaching to more than 500 students across the 4th, 5th and 6th years of the Monash curriculum. In excess of 160 students who had undertaken some or all of their training at The Alfred graduated at the end of 2002, and a considerable proportion of these were subsequently appointed as 1st year Medical Officers at The Alfred and Box Hill Hospitals.
Dr Rotstein treats 5th year students to lunch prior to her lecture

Undergraduate Awards 2002

- Alfred Hospital Residents’ and Graduates’ Association Prize – to the sixth year student who, after studying at the Central and Eastern Clinical School, obtains the highest aggregate of marks in the final examinations – **Nathan Grills**, Victorian Rhodes Scholar, 2002
- Geoff Conron Prize – to the sixth year student who obtains the highest aggregate of marks, or the most deserving student as determined by the Head of unit in the sixth year Psychological Medicine rotation at the Central and Eastern Clinical School – **Christine Jellis**
- Harriet and Robert Power Scholarships in Medicine and Surgery – to a sixth year student from the Central and Eastern Clinical School as determined by a written examination, followed by a vive voce for selected candidates – **Catherine Stark and Alice Huang**
- Harry Hindlip Green Scholarship in Medicine for excellence in Medicine – to a sixth year student from Central and Eastern Clinical School on the basis of results in the final year OSCA – **Nathan Grills**
- RACP Victorian State Committee Prize in Clinical Medicine (MMC and Alfred) – to the top Final Year Student in Clinical Medicine at each school as determined by the highest mark in the 5th Year Medicine/Surgery clinical examinations – **Nathan Grills and Tim Connolly**.

Research

The Clinical School conducts research into the provision of clinical teaching, in association with the Monash Centre for Medical and Health Sciences Education.

PhD Opportunities

PhD opportunities exist in areas as diverse as the evaluation of clinical examination methods to the establishment of the efficacy of web-based teaching modules.

Publications

