Garvan’s mission is to make significant contributions to medical science that will change the directions of science and medicine and have major impacts on human health. Garvan strives to enhance and develop research programs that combine fundamental science with strong clinical interactions.
# Table Of Contents

- Who We Are / What We Do 3
- Research Highlights 4
- Garvan At A Glance 6
- Chairman’s Report - Garvan Institute 10
- Executive Director’s Report 12
- Chairman’s Report - Garvan Research Foundation 14
- Organisation Chart 16

**RESEARCH REPORTS**

- Cancer Program 18
- Diabetes & Obesity Program 24
- Immunology and Inflammation Program 28
- Bone Program 34
- Neuroscience Program 38
- Autoimmunity Research Unit 42
- Pituitary Research Unit 46

- Core Research Facilities 49
- Management Highlights 50
- Business Development 53
- Garvan Community 54
- Institute Governance 60
- Foundation Governance 63
- Publications 2007 67
- Financial Report 73

More information about our research and our staff can be found on Garvan’s website: [www.garvan.org.au](http://www.garvan.org.au)
WE FELT THAT BY FACILITATING CUTTING EDGE MEDICAL RESEARCH WE COULD GIVE BACK TO LIFE WHAT LIFE HAS GIVEN US. SPECIFICALLY, BY LEAVING A BEQUEST WE ALLOW A GROUP OF TALENTED AND DEDICATED SCIENTISTS AT GARVAN TO HELP BRING ABOUT BETTER HEALTH FOR FUTURE GENERATIONS
THE GARVAN INSTITUTE OF MEDICAL RESEARCH IS A WORLD LEADER IN ITS FIELD, PIONEERING STUDY INTO MANY OF THE WIDESPREAD DISEASES AFFECTING OUR COMMUNITY TODAY.

RESEARCH AT GARVAN IS FOCUSED ON UNDERSTANDING THE ROLE OF GENES IN HEALTH AND DISEASE AS THE BASIS FOR DEVELOPING FUTURE CURES

SIGNIFICANT BREAKTHROUGHS HAVE BEEN ACHIEVED BY GARVAN SCIENTISTS IN THE UNDERSTANDING AND TREATMENT OF DISEASES SUCH AS:

- CANCER
- DIABETES AND OBESITY
- ALZHEIMER’S & PARKINSON’S DISEASE
- OSTEOPOROSIS
- ARTHRITIS AND ASTHMA
- PITUITARY DISORDERS

GARVAN’S ULTIMATE GOAL IS PREVENTION AND CURE OF THESE MAJOR DISEASES.
Determined that cancer cell DNA with altered methylation patterns can be found in the blood of women with ovarian cancer, paving the way for a new diagnostic approach.

Demonstrated that the enzyme PKCe is a major new target for a Type 2 diabetes therapy by identifying the roles of this protein in mediating pancreatic beta cell dysfunction and regulating insulin uptake in the liver.

Found that macrophage inhibitory cytokine-1 (MIC-1), a molecule released in high quantities by tumours, acts on the hypothalamus of the brain to inhibit appetite and reduce body weight, providing new hope for the treatment of cancer-related anorexia and obesity.

Characterized a mechanism to stimulate the activity of bone stem cells leading to greater production of bone.

Showed that overexpression of peptide YY, a hormone released in the gut after eating a meal, reduces fat levels long-term and so may be suitable for use in regulating appetite and weight.
Completed a 4 year study on the effects of growth hormone on muscle mass and performance in athletes to evaluate new tests for growth hormone doping. This study identified components of the IGF-system and collagen proteins to be the most promising diagnostic markers of growth hormone abuse in sport.

Demonstrated that the death of insulin-producing cells, which occurs during Type 2 diabetes, is associated with a cellular stress response known as endoplasmic reticulum stress, triggered by too many fatty acids.

Developed new therapeutic approaches for asthma that focus on inhibition of the cytokine GM-CSF.

Determined that S100A2 expression predicts response to therapy for pancreatic cancer and may represent a marker of metastatic disease at the time of surgery.

Found that the TRAF2 and TRAF3 genes inside our B cells maintain a healthy balance within our immune systems when functioning normally, yet may trigger cancers and autoimmune diseases when perturbed.

Identified ways in which the gene, DLEC1, may be used as a biomarker for lung cancer, helping determine the prognosis of patients.

Solved with collaborators the crystal structure of two key proteins (Munc 18c complexed to syntaxin 4 peptide) in the glucose transport system, furthering our understanding of that system and Type 2 diabetes.

Identified a new molecule known as CXCR7 that may explain why some children are born with holes in their hearts or faulty heart valves.

Discovered that adult olfactory stem cells can give rise to new hearing-like cells that are lost in acquired deafness, and so offer the potential to restore hearing in the future.

Developed a world-first graphically-based prognostic model for estimating the individual risk of hip fracture in men and women.

Found that the cytokine IL-21 plays a critical role in the immune response through stimulating the growth of the T cells that collaborate with B cells for antibody production. Also identified mutations in the IL-21 gene that trigger overproduction of the cytokine IL-21 and that pharmacological neutralization of IL-21 in mice inhibits IL-21-driven activation of immune cells, preventing Type 1 diabetes.

Identified a receptor in bone that links signals in the brain to increased bone mass and strength.

Together with Garvan spin-out company G2 Therapies and Novo Nordisk, advanced a new therapeutic monoclonal antibody, anti-c5aR, towards human clinical trials.

Initiated the first trial of a biomarker for prostate cancer outcome in Australia.

Described the importance of the TGF signalling pathway in early-stage breast cancer and observed that critical genes in the pathway are epigenetically silenced in the precursor cancer cell.

Demonstrated that the inactivation of Id1 reduces the growth and metastasis of established tumours, suggesting that Id1 may be a valuable therapeutic target.
RESEARCH COLLABORATIONS

GROWTH IN STAFF NUMBERS

Staff Breakdown

<table>
<thead>
<tr>
<th></th>
<th>2006</th>
<th>2007</th>
</tr>
</thead>
<tbody>
<tr>
<td>Researchers</td>
<td>284</td>
<td>301</td>
</tr>
<tr>
<td>Students</td>
<td>52</td>
<td>61</td>
</tr>
<tr>
<td>Scientific Facility Staff</td>
<td>33</td>
<td>44</td>
</tr>
<tr>
<td>Secretarial and Administration</td>
<td>34</td>
<td>27</td>
</tr>
<tr>
<td>Total</td>
<td>403</td>
<td>433</td>
</tr>
</tbody>
</table>

The average age of Garvan staff is 35, with researchers from 53 countries. Garvan’s research staff is 59% female, 41% male.
Impact factor of scientific publications
Each paper published constitutes a new piece of knowledge, and scientists aim to publish in the most highly regarded journal in their area of research. Each journal has an “impact factor” which is a common measure of its relative importance within a specific discipline. Research organisations use “average impact factor” measurements to determine the overall significance of their research output. For example, in 2007 Garvan achieved an “average impact factor” of 8.2 for the top 80% of its publications. This is a very respectable tally, in keeping with the best international benchmarks.

PATENT PORTFOLIO

Neuroscience [14]
Cancer [12]
Immunology & Inflammation [7]
Diabetes [2]
Bone [2]

Patent Portfolio by Garvan Research Program
GROWTH IN INCOME

One of the major challenges facing successful research institutes around Australia remains the “gap” between the total costs of doing research and the funding provided by competitive research grants. For every dollar of research funding awarded, another 70 cents is required to carry out the research.

GARVAN INCOME

PEER REVIEWED GRANT INCOME

<table>
<thead>
<tr>
<th>Year</th>
<th>NHMRC</th>
<th>Other Peer Reviewed</th>
</tr>
</thead>
<tbody>
<tr>
<td>2002</td>
<td>6810</td>
<td>3638</td>
</tr>
<tr>
<td>2003</td>
<td>8465</td>
<td>5636</td>
</tr>
<tr>
<td>2004</td>
<td>9244</td>
<td>6222</td>
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<td>12080</td>
<td>6865</td>
</tr>
<tr>
<td>2006</td>
<td>13832</td>
<td>8184</td>
</tr>
<tr>
<td>2007</td>
<td>16682</td>
<td>8530</td>
</tr>
</tbody>
</table>
Donations are particularly important in two respects:

1. They provide seed funding for novel work, which may not attract research grant support for several years.
2. They fund core items of equipment and technology that are not typically covered by research grants.

GROWTH IN PHILANTHROPIC SUPPORT

GLANCE AT A CARVAN
2007

2007 was another highly successful year for the Garvan Institute. We progressed several important strategic initiatives as well as continuing our excellent record of research success as measured by grants, publication impacts and international awards. Other highlights included initiation of construction of the major breeding and holding facility for experimental mouse models in the Southern Highlands (Australian BioResources) and rapid progress in development of plans for the new Garvan St Vincent’s Campus Cancer Centre.

Financial Performance

Garvan’s operating income grew to $41.6m in 2007 from $36.9m in the previous year. In the highly competitive environment of international research, this increase is testament to the quality of Garvan research and reflects growth in the activities of existing groups, together with the addition of new groups in our major research areas. Philanthropic support through the Garvan Research Foundation, essential for providing critical equipment and facilitating new initiatives, continued to be strong, with over $3.8m in general and specific grants contributed to Garvan research programs and a further $2.2m into the long term endowment of the Institute.

Our People

Once again my sincere thanks and admiration are extended to Professor John Shine, his senior management team, faculty and staff. It was particularly pleasing to see that the excellence and dedication of Garvan staff were recognised again in 2007 with many prestigious Fellowships, Scholarships and Awards to the faculty and our outstanding more junior researchers. Details of these can be found in this report.

We also have a Board of Directors for whose commitment and counsel I am most grateful. The only change to the composition of the Board during the year was the resignation of Professor Mick Reid, following his retirement from the position of Director General of the NSW Ministry for Science and Medical Research. During his relatively short tenure on the Board, Professor Reid helped ensure that our important relationship with the NSW government remained strong.
Campus Developments

The Garvan Institute is an active member of the St. Vincent’s Campus and values very highly its historic and ongoing close association with St. Vincent’s Hospital and its commitment to the values of the Sisters of Charity.

An exciting initiative for the Campus occurred late in 2006 with the formal agreement between Garvan and St. Vincent’s to develop a dedicated Cancer Centre on Victoria Street, adjacent to the current Garvan building. The Centre will allow the internationally recognised cancer research undertaken at Garvan to be integrated more effectively with the renowned clinical care of St. Vincent’s and Mater Health.

During 2007, the extensive work required to develop the “functional brief” was carried out and a Project Manager appointed.

The vision is to create a facility of international standing and world’s best practice in translational cancer research. This will bring together the highest quality clinicians, clinical researchers and biomedical scientists from across the campus. The objective of the research is to improve patient outcomes in the detection, diagnosis and treatment of cancer. The Centre will accelerate the rate at which new discoveries can be trialled in the clinic.

Business Development

Garvan’s success in our basic research programs is increasingly being matched by progress in translating these research “discoveries” into real outcomes for improved health care. Partnership with industry is key to productive realisation of this potential, and 2007 was characterised by strong growth in our patent portfolio and ongoing success in industry relationships. In particular, development of our key anti-inflammatory antibody through the partnership between G2 Therapies and Novo Nordisk progressed very well over the past 12 months and is on target for clinical trials in mid 2008.

Funding

One of the major challenges facing successful research institutes around Australia remains the “gap” between the total costs of doing research and the funding provided by competitive research grants. For every dollar of research funding awarded, another 70 cents is required to carry out the research. This research support “riddle” remains a source of constant concern for the Board. To address this fundamental issue and to formulate a solution, we continue to work closely with the other major NSW institutes in seeking support from the NSW Government for an expanded and structured approach to the provision of research support.

2008

The year ahead will undoubtedly be both exciting and challenging for Garvan as our infrastructure is placed under ever increasing pressure from our success and growth. Several important new initiatives, particularly the Garvan St. Vincent’s Campus Cancer Centre, offer enormous potential to integrate our research more closely with health care delivery but will require a major increase in financial and human resources.

In this context, the Board has now commissioned an independent review of the Institute’s programs and directions. A review panel of leading international scientists has been assembled for this important task. The panel, chaired by Professor Bruce Dowton, former Dean of the UNSW Medical School and now Senior Vice President at Harvard Medical International, is expected to complete its work midway through 2008. The panel’s report will provide a valuable strategic framework for management and Board in setting future directions for the Institute.
2007 was another outstanding year for Garvan in terms of significant research findings, success in obtaining competitive grants and growth in the number of papers accepted for publication in prestigious international journals. We published 153 peer reviewed research papers, the top 80% in journals with an average impact factor greater than 8. This remains above internationally accepted benchmark levels and is testament to the excellence and commitment of our researchers.

Research publication productivity was matched by success in applications for competitive grants. Our funding from the National Health and Medical Research Council (NHMRC) rose to a record $16.7m, up from $13.8m in 2006. Overall, peer reviewed grant funding remained at approximately $25.2m.

Staff numbers across the organisation continued to grow to a total of over 430. As part of that growth, we were pleased to attract new research teams, including those in antibody engineering and cellular stress, with interests that transcend specific disease areas.

Diabetes Vaccine Development Centre (DVDC)

Garvan welcomed the opportunity to further expand our research into Type 1 diabetes, offered by the relocation of the Diabetes Vaccine Development Centre (DVDC) from Melbourne, effective 1 April. A joint venture between the NHMRC and JDRF (Juvenile Diabetes Research Foundation), DVDC was established 5 years ago to develop vaccines to protect against development of Type 1 diabetes. It has initiated an international clinical trial to test an intranasal insulin formulation as a diabetes vaccine as well as funding a range of other research projects, including some at Garvan. Initially administered by the University of Melbourne, DVDC decided to move to Garvan with support from the NSW government.
People

Tragically, 2007 witnessed the passing of one of our most respected and committed senior researchers. Stuart Furler joined Garvan over 25 years ago, pioneering some early diabetes research. After being diagnosed with pancreatic cancer towards the end of the previous year, Stuart passed away last August. He leaves a legacy of internationally acclaimed research findings. His good humour, humility and unswerving commitment to excellence will be sadly missed.

Professor David James, Director of the Diabetes and Obesity Program, was elected as a Fellow of the Australian Academy of Science. This is a very prestigious and highly competitive appointment and we are proud that another colleague has attained such peer recognition. Garvan now has five Academy Fellows, and while this in itself is gratifying, it also provides more opportunity to influence Australia’s scientific policy.

Professor Ted Kraegen was awarded the Kellion Medal for his pivotal contributions to diabetes research - the highest award given by the Australian Diabetes Society.

The 2007 Garvan Chairman’s Dinner was dedicated to raising funds to establish the Don Chisholm Chair in Diabetes Research. Professor Don Chisholm, head of Garvan’s Diabetes Program for several decades, has achieved iconic status in the world of diabetes research. The evening marked his retirement from active clinical duties, and its great success reflected the admiration and respect felt by those present.

Establishment of endowed Chairs in each of Garvan’s major research areas remains a mid- to long-term goal. This will provide a strong and stable base to each of the Programs and ensure that we can attract and retain internationally leading researchers with commitment to mentoring our more junior faculty members. Through generous support, we have previously been able to establish the Petre Chair in Breast Cancer Research and the Curran Foundation Chair in Neuroscience.

An impressive number of more junior Garvan researchers were awarded a range of prestigious awards, reflecting their standing in the research community. We are proud of their efforts which bode well for Garvan’s future.

2008

Garvan has expanded steadily over the past decade, especially in our cancer, diabetes and obesity, immunology and neuroscience programs. With this growth comes a need to consolidate our resources and take an objective look at our future. Accordingly, we intend to undertake a Strategic Review during the first half of 2008, seeking advice from a panel of international experts on the future directions of Garvan science and structure of the Institute. The panel’s advice will shape our thinking and planning over the next decade.

In addition to growing internally, we continue to establish collaborative relationships and partnerships with other clinical and research organisations. Recent initiatives have included a joint venture with St. Vincent’s Hospital to establish the Garvan St. Vincent’s Campus Cancer Centre - the ~$100m enterprise will link cancer research more closely with clinical care; as well as a $20m breeding and holding facility for experimental mice lines.

In the year ahead, we will remain clearly focused on elucidating the fundamental basis of disease while ensuring we translate our research discoveries into new and improved ways to prevent and treat the major diseases that challenge our society.
2007

I am pleased to report that the Garvan Research Foundation’s results have exceeded expectations in 2007. Total funds raised (excluding bequests) were a record $5.4m, well above our previous best of $4.2m in 2006. In 2007, bequests totalled $1.8m. Our direct marketing initiative, launched in 2006, yielded over 1500 new supporters in 2007. We grew our annual grant to the Institute to $750,000, and contributed $3.1m to specific research programs or projects. We were also successful in growing the endowment fund with a further $2.2m in 2007, so that it has now reached about $27m as opposed to $10m in 2004.

Major gifts

We have been very fortunate in our major gifts this year. There are a few people who gave such critical support that I would like to convey our thanks here: for example, to Mr. Trevor and Mrs. Christina Kennedy and Lady (Mary) Fairfax for gifts to our hearing loss research. Coupled with the Curran Foundation’s 2006 gift to establish a Neuroscience Chair in this same area of endeavour, these gifts have built a very significant platform to achieve our aim of restoring hearing.

Mrs. Janice Gibson and the Ernest Heine Family Foundation chose to support our Dubbo Osteoporosis Epidemiological Study at a time when the program was endangered through a shortfall in grant funding. This gift enables us to take the Study into its next phase, developing screening tools for general practitioners to assess their patients’ absolute risk of developing osteoporosis.

The refurbishment of Garvan’s staff cafeteria was made possible this year with the generous financial support of Mr Les Schirato and Vittoria Coffee, who also donated a state of the art coffee machine. An in-house café will facilitate cross disciplinary interaction and will be an integral aspect of the Garvan research environment.

Major gifts from the corporate sector grew in 2007. I would like to affirm our appreciation to MLC and Witchery for their long-term loyalty to Garvan. GSK made two pledges this year to establish a named Fellowship in diabetes research in honour of Professor Don Chisholm, and also to contribute towards establishment of the Don Chisholm Chair. Both Amgen and Novartis made significant gifts to the Dubbo Osteoporosis Epidemiological Study. We are very pleased to have Qantas rekindle its relationship with Garvan, with in-kind support to ease the Institute’s heavy travel cost burden.
Our Chairman’s Dinner in September 2007 raised funds of over $1m for the Don Chisholm Chair. This included a $500,000 grant from the Federal Health Minister and a gift of $100,000 from the Diabetes Australia Research Trust. Our guests enjoyed the talents of Ms Marcia Hines, a long-term champion of the diabetes cause, who generously donated her time.

A recent trend in philanthropy has been the rise of foundations as vehicles for giving. Garvan was fortunate in receiving support this year from the Macquarie Goodman Foundation, the Cochlear Foundation and the EJ Whitten Foundation, among others.

Bequests

Bequests are critical to our ability to grow the endowment fund. In 2007, Garvan has received bequests from the estates of the late Charlotte May Trunshing (for osteoporosis); Lindsay H Franks (for cancer); and Marjorie Grace Lawn, among others.

Public Education

In 2007 we were fortunate to secure support from the Alcoa Foundation for our public seminar series. We also piloted a new workplace health education program at Alcoa Australia’s Yennora (Sydney) site. Employees learnt about the risks of diabetes, osteoporosis and prostate cancer and how to manage these diseases.

Our Young Garvan group continues to deliver informative sessions for the 25-35 year old demographic, thanks to the hard work of the Young Garvan Committee and our talented MC, Andrew O’Keefe.

We gratefully acknowledge the support from several leading Australian artists and the Sherman and Oxley galleries for our 2007 Science as Art fundraising event.

Board and Staff Changes

I wish to take this opportunity to thank my fellow Directors for their commitment. Mr. Marvin Weinman retired from the Board and we welcomed Ms Jane Allen, Mr. John Landerer AM and the Hon. Warwick Smith AM as new Directors in 2007.

The Foundation team continues to develop, with the addition of Lisa Hill as Relationship Manager in 2007. Monica Schneider stepped into the position of Fundraising Coordinator. Danielle Fischer relocated to Brisbane and Nikki Alling took her place as Public Awareness and Community Education Manager. Under the leadership of our CEO, Carole Renouf, the team continues to do a wonderful job within a very lean expenditure budget – as our donors rightly expect of us.

It only remains for me to thank, most warmly, all those who have given in 2007 to underpin the excellence in research of which we are all so proud.
Garvan Institute of Medical Research
Board of Directors
Chair: Mr Bill Ferris AC

Garvan Research Foundation
Board of Directors
Chair: Mr Graham Bradley

Executive Director
Prof John Shine AO FAA

Development & Support Group
Mr John Dakin
Chief Operating Officer
Dr Jenny Kingham
Biological Testing Facility
Ms Christina Hardy
Business Development & Legal Affairs
Dr Branwen Morgan
Communications
Ms Cherry Dutton
Finance and Accounting
Ms Cate Smith
Corporate Services
Ms Jodi Fisher
Human Resources
Mr Jim McBride
Information Technology
Mr David Keenan
Operations
Dr Jeff Freeman
Facilities Development & Engineering

Immunology & Inflammation
Prof Charles Mackay
Senior Scientists:
Dr Shane Grey
Dr Cecile King
Dr Michael Rolph
Prof Jonathan Sprent FRS FAA
Dr Stuart Tangye

Diabetes & Obesity
Prof David James FAA
Senior Scientists:
A/Prof Trevor Biden
Prof Lesley Campbell
Prof Don Chisholm AO
A/Prof Greg Cooney
A/Prof Antony Cooper
Prof Ted Kraegen
A/Prof Katherine Samaras
Dr Carsten Schmitz-Peiffer

Core Research Facilities
Peter Wills Bioinformatics Centre
Pieter Huveneers Molecular Imaging Unit
Gene Chip Facility
Biological Testing Facility
Clinical Research Facility
Cyttofluorometry Facility
Australian Cancer Research Fund
Unit for the Molecular Genetics of Cancer

Neuroscience
Prof Herbert Herzog
Senior Scientists:
Dr Sharon Oleskevich
Dr Amanda Sainsbury-Salis
Dr Bryce Vissel

Cancer
Prof Rob Sutherland FAA
Senior Scientists:
Prof Sue Clark
Prof Roger Daly
A/Prof Sue Henshall
A/Prof Liz Musgrove
A/Prof Chris Ormandy

Cancer Development Laboratory
Prof Marie Dziadek

Bone & Mineral
Prof John Eisman AO
Senior Scientist:
Dr Tuan Nguyen

Board Committees
- Business Development Advisory
- Finance & Audit
- Investment

Institute Committees
- Appointments & Promotions
- BTF Policy Advisory
- Building & Equipment
- Director’s Executive
- Higher Degrees
- Information Technology
- Publications
- Occupational Health & Safety
- Seminars
- Senior Scientists

Campus Committees
- Animal Ethics & Experimentation
- Human Research Ethics
- Institutional Biosafety

Garvan is a partner in the CRCs for Asthma, Biomedical Imaging, and Innovative Dairy Products.

Garvan is a shareholder in the spin-out companies AZA Research Pty Ltd and G2 Therapies Ltd.
WHAT DRIVES EVERY LEADING SCIENTIST, ON A DAY-TO-DAY BASIS, IS THE EXCITEMENT OF DISCOVERY. AT GARVAN, WE’RE VERY FORTUNATE BECAUSE WE CAN COUPLE THAT EXCITEMENT OF DISCOVERY WITH TRANSLATION INTO NEW WAYS TO PREVENT AND TREAT DISEASE. KNOWING YOU HAVE INSTIGATED SOMETHING THAT BRINGS ABOUT AN IMPROVED QUALITY OF LIFE FOR MANY IS VERY SATISFYING.
I WORK ON BREAST CANCER, TRYING TO FIGURE OUT WHY SOME CANCERS GROW AGGRESSIVELY AND RESIST CHEMOTHERAPY. I’M PURSUING THE CURRENT THEORY THAT BREAST CANCER MAY BE REPLENISHED BY RARE STEM-LIKE CELLS, IN THE SAME WAY AS A QUEEN BEE REPLENISHES A HIVE. IF SUCH ‘QUEEN BEE’ CELLS EXIST, I HOPE TO FIND THEM SO THAT WE CAN DESTROY THEM, RATHER THAN THE ‘WORKER BEE’ CELLS WE TARGET IN CURRENT TREATMENTS.
Determined that the signalling protein cortactin could be used as a biomarker to aid the selection of head and neck cancer patients for appropriate drug therapy.

Initiated the first trial of a biomarker for prostate cancer outcome in Australia.

Determined that cancer cell DNA exhibiting altered methylation patterns can be found in the blood of women with ovarian cancer, paving the way for a new diagnostic approach.

Demonstrated that loss or downregulation of CRBP1, a key component of retinoic acid signalling, is a common and early event in pancreatic cancer suggesting a potential role in pancreatic carcinogenesis.

Identified a novel regulatory mechanism for the Gab2 oncoprotein that may be targeted in the development of anti-cancer therapeutics.

Established that prolactin acts on pre-cancerous lesions to convert them to tumours, suggesting that anti-prolactin therapies may be useful in preventing progression of such lesions to invasive carcinomas.

Demonstrated synergistic effects of the anti-oestrogen tamoxifen and the avocado toxin persin on killing breast cancer cells in culture, and identified the mechanism by which this happens.

Described the importance of the TGFß signalling pathway in early-stage breast cancer and observed that critical genes in the pathway are epigenetically silenced in the precursor cancer cell.

Demonstrated that expression of a particular isoform of the progesterone receptor prevents breast cancer cells responding to tamoxifen.

Developed an improved method for genomic profiling of CpG methylation and allelic specificity using quantitative high-throughput mass spectrometry, allowing us to determine inherited epigenetic susceptibility to cancer and possible parent-of-origin effects in large clinical sample sets.

Identified different suites of genes, grouped by function, that trigger different mechanisms of tamoxifen resistance, giving us more information about how individual breast cancers with alterations in expression of these different groups of genes, may respond to treatment.

Used a model of early breast cancer to show that the transcriptional regulator Id1 leads to proliferation of cells, but requires cyclin D1 to have this effect, telling us more about which genes regulate the very early stages of breast cancer.

Demonstrated that the inactivation of the Id1 gene reduces the growth and metastasis of established tumours, suggesting that Id1 may be a valuable therapeutic target.

Showed that the secreted frizzled-related protein 4 is an inhibitor of prostate cancer growth and spread, independent of the cancer’s androgen responsiveness.

Identified ways in which the gene, DLEC1, may be used as a biomarker for lung cancer, helping determine the prognosis of patients.

Determined that S100A2 expression predicts response to therapy for pancreatic cancer and may represent a marker of metastatic disease at the time of surgery.
Andrew Biankin and Vanessa Hayes were each awarded the Cancer Institute NSW Premier’s Award for Outstanding Cancer Research Fellow 2007

Marie Dziadek was promoted to Conjoint Professor at UNSW

Kate Patterson was awarded the Best Student Poster Prize and Sam Oakes the Best Postdoctoral Poster Prize at the Australian Society for Medical Research NSW Scientific Meeting

Kate Patterson was also awarded the Millennium Science Best Student Prize at the Familial Cancer Annual Meeting, the Roche Award for the Best Student Poster Prize at the 17th St Vincent’s and Mater Health Sydney Research Symposium and Best Student Poster Prize at the 4th Garvan Signalling Symposium

Alex Swarbrick was awarded the University of Sydney Medal for Research Excellence at the ASMR NSW Scientific Meeting

Elizabeth Tindall was awarded a plaque from the Rotary Health Research Foundation for her PhD research work

Sam Oakes and Liz Caldon were awarded PhDs (UNSW)

Vanessa Hayes was awarded a prestigious NSW & ACT 2007 Young Tall Poppy Award from the Australian Institute of Policy and Science in recognition of her research in prostate cancer

Chris Ormanny was awarded a renewal of his NHMRC Senior Research Fellowship

Sandra O’Toole was awarded an NH&MRC Health Professional Research Fellowship and a CINSW Clinical Research Fellowship

Liz Musgrove, Maija Kohonen-Corish, Sue Henshall, Vanessa Hayes and Andrew Biankin were successful in renewing their CINSW Career Development and Support Fellowships for a further three years

Marcel Coolen, David Croucher and Toby Hulf were awarded CINSW Early Career Development Fellowships

Nick Sigglekow received the CINSW Student Oral Presentation Award at the 17th St Vincent’s and Mater Health Sydney Symposium

Tilman Brummer was awarded Best Poster Prize at the 4th Garvan Signalling meeting in October for his study identifying a novel regulatory mechanism for the Gab2 signalling protein

Rebecca Hinshelwood received a poster prize at the National Epigenetics Conference in Perth

Alison Ferguson was awarded First Class Honours for her Honours project supervised by Sue Henshall and James Kench

Anne-Maree Haynes, who co-ordinates all clinical research studies in the Prostate Cancer Group, was awarded a travel grant from the Cancer Institute NSW to attend the meeting of the International Society for Biological and Environmental Repositories (ISBER) held in Singapore, May 2007
Although derived from normal cells, cancer cells have distinctive features that can be exploited to aid diagnosis, treatment, and prognosis. To do this, we need to know much more about the fundamental processes that govern cell behaviour: their division, their survival, and their differentiation into complex tissue structures. With this knowledge, we will be better able to stop the formation and early growth of cancers.

As well as basic research into cell and molecular biology, the Garvan's Cancer Program has six translational research groups that study a number of the most commonly diagnosed and most lethal cancers: breast, colorectal (bowel), lung, ovarian, pancreatic and prostate.

**Cell Cycle Group**  
*Group Leader: Associate Professor Liz Musgrove*

Female steroid hormones like oestrogen and progesterone strongly influence cell reproduction in the breast. We are particularly interested in how these hormones act on the cell cycle machinery and how control over the cell cycle is lost in breast cancer cells. Since the cell cycle gene cyclin D1 is frequently overexpressed in breast cancer, we have been studying genes that act upstream of cyclin D1. In collaboration with the Steroid Hormone Action and Breast Cancer Translational Groups, we are also searching for new genes that might link oestrogen action with the cell cycle and so could be involved in resistance to the anti-oestrogen tamoxifen in the clinic.

**Steroid Hormone Action Group**  
*Group Leader: Professor Rob Sutherland*

Our research aims to determine and characterise the genes that mediate the actions of the sex steroid hormones oestrogen, progesterone, and androgens in steroid-responsive cancers, which constitute a third of all newly diagnosed cancers.

In collaboration with the Cell Cycle and Apoptosis Groups we have identified and are characterising a number of steroid regulated genes involved in the control of cell proliferation and death in breast cancer. In partnership with the Breast and Prostate Cancer Groups and the Cancer Development Laboratory we have demonstrated that some of these genes are new markers of cancer progression and response to therapy and new targets for the development of new cancer therapies.

**Apoptosis Research Group**  
*Group Leader: Dr Alison Butt*

Oestrogen not only causes breast cancer cells to proliferate, but it also protects them from apoptosis (cell death). We are investigating how this occurs and identifying the genes that regulate this process. This will enable us to understand how these genes may influence the way anti-oestrogens such as tamoxifen can effectively kill breast tumour cells. Other projects include examining how novel compounds derived from plants can induce apoptosis in breast cancer cells. This could lead to their development as new therapies for the treatment of breast and other cancers.

**Signal Transduction Group**  
*Group Leader: Professor Roger Daly*

Our research focuses on three proteins involved in either the transmission of signals within the cell or the regulation of these signalling events: Gab2, cortactin and Grb14. Overexpression of Gab2, which is found in a subset of breast cancers, increases not only the proliferation of cancer cells but also their invasive properties. The latter effect suggests that Gab2 may promote cancer cell spread throughout the body. High levels of cortactin are found in some breast and head and neck cancers, and we have identified that this protein increases resistance to a new drug currently in clinical development. Together with researchers in the Diabetes Program, we are studying how Grb14, and related proteins, regulate the metabolic and growth-promoting effects of insulin and insulin-like growth factors.
Epigenetics Group
Group Leader: Associate Professor Sue Clark

Cancer cells can modify the expression of critical cancer genes independently of the DNA sequence, using two ‘epigenetic’ biochemical processes, called DNA methylation and histone modification. Our research focuses on understanding the mechanism that triggers abnormal methylation and histone modification between normal and cancer cells. We have developed different methods to detect methylation changes during early cancer development and have discovered that these ‘epigenetic’ changes can take place not only in single genes, but can also occur across very large regions of DNA during the spread of cancer. These changes provide novel tumour ‘signatures’ for cancer diagnosis, as well as potential targets for cancer therapy. We are now trying to work out what changes are specific for breast and prostate cancer and what is the sequence of events that triggers these changes so that we can try to reverse the process.

Development Group
Group Leader: Associate Professor Chris Ormandy

Development of the mammary gland occurs in defined stages that are governed by the hormones that regulate reproductive events. Our hypothesis is that the genes that control normal mammary development can become mutated or dysregulated in breast cancer, altering or subverting their normal function and so contributing to the disease process. We must understand how genes program normal development if we are to understand how the program goes awry in cancer. Key genes in these processes may provide targets for future therapies. Our current focus is on discovering the genes that respond to prolactin - a hormone that plays an important role in normal mammary cell proliferation, differentiation and lactation, but when in excess can increase the risk of developing breast cancer.

Breast Cancer
Group Leader: Professor Rob Sutherland

In association with clinicians at St Vincent’s and other hospitals we have developed large tissue banks and patient databases that are being used to identify markers of disease subtype, disease progression and response to particular therapies. A major joint project, with the Cell Cycle and Steroid Hormone Action Groups, is identifying molecular markers of tamoxifen resistance, since loss of response to tamoxifen is a major reason for treatment failure. We are also conducting collaborative studies with other institutions to define the role of newly-discovered breast cancer genes in the disease process.

Lung and Colorectal Cancer
Group Leader: Dr Maija Kohonen-Corish

We examine the gene profiles from cancer specimens from patients whose clinical outcomes are already known. The challenge is to work out which key gene alterations are the most useful for determining prognosis and treatment outcomes. We have identified new genes that are inactivated through methylation, which is still a poorly understood molecular mechanism promoting cancer development. Methylation can be identified from surgically resected cancers or tumour biopsies in the research laboratory but these procedures are not routinely carried out yet in clinical practice. Our aim is to develop tests that can be applied for these genes in hospital laboratories. We also want to understand the biological significance of the gene defects to enable development of new treatment strategies.

Ovarian Cancer
Group Leader: Dr Pip O’Brien

Our group works in collaboration with the Gynaecological Cancer Centre at the Royal Hospital for Women. Our major research goal is to use our combined expertise and knowledge to identify new ways to diagnose women with early stage curable ovarian cancer. To this end, we utilise a number of different approaches to understand the genes involved in the development of ovarian cancer, particularly its early stages. Our current primary focus is the identification of genes with altered methylation patterns that have potential as blood-based diagnostic markers for early stage ovarian cancer. We also aim to understand how such genes influence ovarian cancer development, which may additionally identify new treatment targets for women with advanced disease.
CANCER DEVELOPMENT LABORATORY

RESEARCH DIRECTOR: Professor Marie Dziadek

A new initiative, the Cancer Development Laboratory (CDL) was set up in mid-2007 to identify molecular targets that hold promise for cancer drug discovery. Garvan anticipates that CDL validation work will lead to increased commercialisation of research from the Cancer Program. The first project involves the analysis of a protein involved in the growth and metabolism of many different types of cancer. The aim will be to find drugs that block the action of that protein.

Prostate Cancer

Group Leader: Associate Professor Sue Henshall

Our group is concerned with the identification of markers for therapeutic responsiveness, prognostic markers, and new markers of early prostate disease. We take a multidisciplinary approach that utilises expertise from a number of cancer researchers within and outside the Garvan, as well as clinicians and pathologists.

Our research aims to identify genes and pathways whose expression changes can predict the development of aggressive life-threatening prostate cancer or resistance to chemotherapy used for the treatment of advanced stage prostate cancer.

Pancreatic Cancer

Group Leader: Dr Andrew Biankin

Pancreatic cancer is the fifth leading cause of cancer death in Western societies, with a five year survival rate of less than 10%. The treatment and survival of patients with pancreatic cancer has not changed for over thirty years because there has been little research into the molecular and cell biology associated with it. Our projects focus on understanding the role of retinoic acid signalling pathways in pancreatic cancer and defining new diagnostic and treatment strategies that may extend the successful use of retinoids seen in leukemia and skin cancer to pancreatic cancer.

Cancer Genetics

Group Leader: Dr Vanessa Hayes

Cancer genetics is the study of the genetic basis of human malignancies. We are concerned with the identification and characterisation of genetic variations (mutations) within the human genome sequence that influence not only cancer development and progression, but also individual cancer risk and individual response to therapies. Our group is particularly interested in susceptibility genes of hormone regulation and inflammation in cancers of the breast and prostate. Our research is part of a nation-wide project aimed at determining predisposition to these cancers in the Australian population. Our discoveries may be useful not only in identifying individuals at high-risk of developing these cancers prior to the onset of symptoms, but will also aid in developing better diagnostic and treatment strategies.
TYPE 2 DIABETES IS A DISORDER OF ENERGY METABOLISM, AND I HAVE ALWAYS BEEN FASCINATED BY THE PROCESSES WE USE TO CONVERT FOOD INTO ENERGY. NORMAL FUNCTIONING OF THE LIVER IS VITAL FOR OUR HEALTH, SO THROUGH MY EXPERIMENTS I’M INTERESTED IN UNDERSTANDING WHAT GOES WRONG IN THIS REMARKABLE ORGAN AND FINDING WAYS TO FIX IT.

Dr Bronwyn Hegarty
Postdoctoral Researcher
DIABETES PROGRAM
o Demonstrated that the enzyme PKCε is a major new target for a Type 2 diabetes therapy, by identifying the roles of this protein in mediating pancreatic beta-cell dysfunction and regulating insulin uptake in the liver

o Demonstrated in humans that the death of insulin-producing cells, which occurs during Type 2 diabetes, is associated with a cellular stress response known as endoplasmic reticulum stress, triggered by too many fatty acids

o Showed in muscle cells that high levels of di-linoleoyl phosphatidic acid (a product of fatty acid metabolism), increases susceptibility to insulin resistance

o Used sophisticated microscopy (TIRF) to understand the action of GLUT4 (a glucose transporter inside cells that is regulated by insulin), helping us to understand how exercise or drugs could act as substitute regulators in the absence of insulin

o Solved with collaborators the crystal structure of two key proteins (Munc 18c complexed to syntaxin 4 peptide) in the glucose transport system, furthering our understanding of that system and Type 2 diabetes

o Made use of gene overexpression technologies in mice to demonstrate that increase in stress factors (eg NFκappa B), or decrease in insulin signalling proteins (eg Akt) are not always associated with reduced insulin action in muscle

o Showed that insulin-sensitive relatives of people with Type 2 diabetes have impaired ability to use fat for energy after a high fat meal, which could be one reason why they have an increased risk of developing Type 2 diabetes themselves

o Professor Ted Kraegen received the prestigious Kellion Award of the Australian Diabetes Society, which is awarded annually in recognition of outstanding achievement in the field

o Drs Leonie Heilbronn and Nigel Turner each received a 4 year NHMRC Career Development Award

o Mark Larance and Jamie Lopez successfully obtained their PhD degrees

o NHMRC project grants were awarded to the following chief investigators: A/Prof Trevor Biden, A/Prof Gregory Cooney, Prof David James, Prof Ted Kraegen, Dr Carsten Schmitz-Peiffer, and Dr Jiming Ye

o A/Prof Trevor Biden and Dr Ross Laybutt, together with two other Garvan researchers, successfully applied for a 5 year Program Grant in the area of Type 1 diabetes, jointly funded by NHMRC and JDRF

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A Lilly Partnership in Diabetes Research Award was made to Dr Carsten Schmitz-Peiffer
The growing incidence of obesity is driving a world-wide epidemic in Type 2 diabetes, a disease which already affects nearly 1 in 10 of the Australian population. Research in this program is focused on the molecular regulation of body weight and fuel metabolism, and a better understanding of Type 2 diabetes at multiple levels. There is a particular emphasis both on the release of insulin and its mode of action in normal and disease states. Research strengths include live cell microscopy, the use of mass spectrometry for the discovery of new molecules affected by metabolic disease, \textit{in vivo} gene manipulation and metabolic studies in humans.

James Group

\textbf{Group Leader: Professor David James}

A major action of insulin that becomes defective in Type 2 diabetes is the regulated entry of nutrients into our muscle and fat cells. Our goal is to use our newly-developed molecular imaging methods to uncover the path that insulin takes from when it binds to cells to when it encounters its final target, and how it achieves its ultimate goal: allowing glucose to gain entry to a cell. Numerous proteins interact with insulin and glucose on this journey. We are also intrigued by the constant movement of proteins within cells, the direction and rate of which is precisely controlled and are investigating the mechanisms underlying this. We have also recently discovered several new components of the insulin signal transduction cascade. These have unveiled novel actions of insulin that we are investigating using gene targeting in both cell lines and mice.

Kraegen Group

\textbf{Group Leader: Professor Ted Kraegen}

Understanding how too much fat causes insulin resistance in muscle and liver is the major thrust of our work. Various experimental models and state-of-the-art techniques are being used to identify and manipulate key proteins in muscle that link fat metabolism to insulin action. Important pathways under investigation are those activated by the newly discovered hormone adiponectin and involving the enzyme AMP-kinase. We are also delving into traditional Chinese medicines with collaborators in Shanghai to identify new insulin-sensitising agents that could be more useful than current therapeutics. Work is also underway in partnership with pharmaceutical companies to identify ways of reducing fat accumulation by influencing the rate of entry of fatty acids into mitochondria for oxidation.

Cooney Group

\textbf{Group Leader: Associate Professor Greg Cooney}

Our major focus is to understand factors that control fat accumulation in muscle and liver and to use this information to devise strategies to reduce fat. When fat enters a muscle cell from blood there are two choices. It is either stored as an intracellular lipid or it is channelled into the mitochondria, where it is burned for energy. In particular we are studying the regulation of glucose and fatty acid metabolism by mitochondria and also what changes occur to normal metabolic cycles when tissues are exposed to too much fat at different times of the day. This could help explain the contribution of increased food availability and altered eating habits to the rapid increase in obesity and metabolic disease.

Clinical Studies

\textbf{Group Leader: Associate Professor Katherine Samaras}

Why does diabetes develop and are our genes and our abdomens involved? Our investigations found that human subjects with a genetic risk for diabetes possess muscle enzymes that are poorly adaptive to higher energy intake. This highlights the tendency to weight gain, which has a critical impact on diabetes development, and is an ongoing focus of our work. We are also investigating how weight loss improves metabolic pathways, with emphasis on sites of inflammation and blood vessels. Our work also involves patients from St Vincent’s HIV Centre who may develop insulin resistance and lipodystrophy as a result of their treatment. Findings from the study of these different populations should contribute to improved methods for preventing or treating Type 2 diabetes and obesity.
Biden Group

**Group Leader:** Associate Professor Trevor Biden

Identifying and preventing the cellular mechanisms whereby fatty acids disrupt beta-cell function is our major goal. These processes are fundamental to the progression of Type 2 diabetes, yet are very poorly understood. We are piecing together the mechanism of action of PKCε, an enzyme we found to be a key determinant of defective insulin secretion. We plan to identify inhibitors of this enzyme as a possible future therapy for Type 2 diabetes. We are also examining the molecular links between fatty acids and beta-cell death, with particular emphasis on ER stress, which we have shown occurs in beta-cells of human subjects with Type 2 diabetes.

Schmitz-Peiffer Group

**Group Leader:** Dr Carsten Schmitz-Peiffer

This group focuses on the lipid metabolites that disrupt insulin signalling and how these contribute to insulin resistance. A new study area has been initiated by our discovery that di-linoleoyl phosphatidic acid is an important inhibitor of insulin signalling. We are collaborating with industry partners to block production of this metabolite, and also plan to verify our findings in human subjects. Another focus is PKCε, which exerts action on liver that decreases whole-body availability of insulin. This, in addition to its actions in beta-cells, constitutes a second reason for inhibiting PKCε as a potential therapy for Type 2 diabetes.

Laybutt Group

**Group Leader:** Dr Ross Laybutt

Pancreatic beta-cell failure is fundamental to the development of diabetes. Our goal is to identify the mechanisms responsible for beta-cell destruction and the loss of insulin secretion that cause diabetes. We are investigating the hypothesis that in Type 2 diabetes a gradual rise in blood glucose (hyperglycaemia) and lipid levels lead to a loss of the unique expression pattern of genes necessary for appropriate insulin secretion. This worsens hyperglycaemia, which causes further beta-cell dedifferentiation and eventually beta-cell death. In models of Type 1 diabetes, we are investigating the role of endoplasmic reticulum (ER) stress as a mechanism responsible for beta-cell destruction.

Phospholipid Biology

**Group Leader:** Dr Will Hughes

Phospholipids are the basic building blocks of cell membranes but some are also dynamically regulated to control many of the major functions of cells. We are developing reagents to identify where, when and why specific phospholipids are produced, how they participate in cellular events and how these processes may be disrupted in diseases particularly diabetes and cancer. This year, using a new state-of-the-art microscope in the Garvan’s Molecular Imaging Facility, we identified a novel role for a phospholipid in regulating insulin-stimulated glucose uptake in muscle - a process defective in diabetes.

Cellular Stress

**Group Leader:** Dr Antony Cooper

We aim to understand how cells cope, or fail to cope, with the stress that can result from the over-production of proteins and misfolding of proteins within a cellular compartment called the endoplasmic reticulum (ER). ER stress is directly applicable to a growing number of diseases including not only diabetes, but diseases of the brain like Huntington’s, Parkinson’s, Alzheimer’s and motor neuron disease. Either the cell ‘burns out’, generates an excess of harmful products, or accumulates unmanageable amounts of unusable proteins, which ultimately lead to cell death. If we can elucidate how these stressors induce cell death, we may be able to identify potential points of intervention to help cells deal with extra demands.

Diabetes Signalling Unit

Failure of specific intracellular signalling pathways in multiple sites in the body contributes to Type 2 diabetes. The work of the groups in this unit therefore spans the major organs implicated in whole-body fuel use: the pancreatic beta-cells, liver and skeletal muscle.
I AM A GREAT BELIEVER IN CURiosity DRiven BASIC RESEARCH.
THE EUREKA MOMENTS WE CHERISH AS SCIENTISTS OFTEN ARISE LARGELY
BY CHANCE AND ARE VITAL FOR POINTING US IN NEW DIRECTIONS,
IN MY CASE USING KNOWLEDGE OF THE IMMUNE SYSTEM TO DEVISE
METHODS FOR TREATING CANCER AND AUTOIMMUNE DISEASE.

Professor Jonathan Sprent
Leader Cellular Immunity Research Group
IMMUNOLOGY AND
INFLAMMATION PROGRAM
Found that the cytokine IL-21 plays a critical role in the immune response through stimulating the growth of the T cells that collaborate with B cells for antibody production. Also identified mutations in the IL-21 gene that trigger overproduction of the cytokine IL-21 and that pharmacological neutralization of IL-21 in mice inhibits IL-21-driven activation of immune cells, preventing Type 1 diabetes.

Developed new therapeutic approaches for asthma that focus on inhibition of the cytokine GM-CSF.

Together with Garvan spin-out company G2 Therapies, advanced a new therapeutic monoclonal antibody, anti-c5aR, towards human clinical trials. This was licensed to Novo Nordisk in early 2007.

Identified factors that improve the outcomes of islet (pancreatic insulin-producing cells) transplantations for Type 1 diabetes.

Progressed our knowledge about the artificial generation of insulin-secreting beta cells for transplant into humans.

Discovered that immune cells are sensitive to high levels of certain dietary fatty acids in the blood, and that this stimulation can alter the progress of Type 1 Diabetes through its effect on immune cell function.

Identified factors that prevent inactivation of monoclonal antibodies by aggregation, a major limitation in the production of antibody therapeutics.

Identified some of the genes that are involved in our bodies’ capacity to “remember” infection, and fight it better the second time around, knowledge that could be useful in developing new vaccines.
Professor Charles Mackay was awarded a Senior Principal Research Fellowship from the NHMRC.

Dr Stuart Tangye was awarded a Senior Research Fellowship from the NHMRC.

Drs Cindy Ma and Elissa Deenick were awarded prestigious research fellowships from the NHMRC.

Dr Shane Grey was awarded a $3m program grant by the NHMRC to improve the success rate of islet transplantation for the cure of Type 1 diabetes.

Dr Rachel Kohler was awarded a Cancer Institute NSW Early Career Development Award.

Dr Daniel Christ was awarded a Cancer Institute NSW Fellowship and was invited to present recent progress and participate in a panel discussion at the annual PEGS (Protein Engineering Summit) meeting in Boston.

Santi Suryani was awarded a Research Scholar Award from the Cancer Institute NSW.

At the Transplant Society of Australia and New Zealand meeting, Kylie Webster was awarded the President’s Prize for the best young investigator abstract and was also awarded a Peter Doherty Postdoctoral Research Fellowship. Stacey Walters and Kylie Webster were selected as “new current opinion leaders” at the same meeting, while Stacey Walters was awarded the Kidney Health Australia award for the best overall abstract. In addition, Rebecca Stokes was awarded a Young Investigator prize.

Kim Cheng was awarded a Young Investigator prize from the Australian Diabetes Society.

Dr Jenny Gunton was awarded a L’Oréal for Women in Science Fellowship.

Dr Sue Mei Lau received an Australian Women in Endocrinology (AWE) New Investigator Travel Award, for ENDO 2007, Toronto, and a Graz Clock Award for best scientific presentation at the Australasian Diabetes in Pregnancy Society Annual Meeting.

Professor Jonathan Sprent was invited to give keynote addresses at a number of international meetings in Brazil, France, the UK and South Korea, including the International Congress of Immunology in Rio de Janeiro.
Our researchers study aspects of immune function in normal and diseased situations. We hope to understand the basis for diseases such as rheumatoid arthritis, autoimmune diseases, diabetes, asthma and immunodeficiencies, and also to develop new therapies to treat disease. We also collaborate with Garvan scientists in other programs on cross-discipline projects such as finding links between immunology and metabolic systems, cancer and the nervous system.

**Arthritis and Inflammation**

*Group Leader: Professor Charles Mackay*

We are trying to better understand the process of inflammation and joint damage in the development of rheumatoid arthritis and other inflammatory diseases. Our studies have led to development of antibodies that can intervene in the inflammatory process and these are being commercialised by Garvan spin-off company G2 Therapies Ltd. We have used a combination of microarrays and animal models of disease to dissect the important pathways and molecules responsible for disease. This has led to focused efforts on the cytokine IL-21, chemoattractant receptors such as C5aR and GPR43, and other important immune molecules. Other projects are based on dissecting the immune cells’ signaling pathways, again with the express purpose of finding points of intervention that may help control inflammatory conditions, such as asthma, arthritis and multiple sclerosis. Our research is based on the development of new therapeutic approaches for asthma, in particular, developing monoclonal antibodies as therapeutic tools; and studying the link between diet, fatty acid binding proteins and asthma.

**Asthma**

*Group Leader: Dr David Zahra*  
*Part of the CRC for Asthma and Airways*

We have three main lines of research: developing new therapeutic approaches for asthma, in particular, monoclonal antibodies as therapeutic tools; studying the link between diet, fatty acid binding proteins and asthma; and looking more broadly at the links between inflammatory and metabolic diseases because we now know that inflammatory cells release signaling molecules called cytokines that can affect various aspects of metabolism. Our work with GMCSF, a known haemopoietic growth factor and cytokine, is a good example of new therapeutic approaches. Over expression of this cytokine has been observed in many inflammatory diseases. Mouse models of arthritis and asthma have been used to show that disease can be suppressed or stopped by removing or neutralizing the activity of GMCSF. In mice, we have generated an antibody that neutralizes human GMCSF and defined the region (epitope) that binds to GMCSF. The binding epitope is unique and two provisional patents have been filed in relation to these developments. This antibody is now ready for toxicology studies and pre-clinical development. Discussions have been initiated and are continuing with a number of major pharmaceutical companies to license these antibodies.
Cellular Immunity

**Group Leader:** Professor Jonathan Sprent

Our team is interested in the development and fate of T cells - white blood cells that participate in a variety of immune responses but are able to somehow distinguish between self and foreign antigens. One of the unknown questions that is central to maintaining the immune system’s homeostasis is how are these cells destroyed once their mission is complete and infections are overcome. We know that most self-destruct and a few live on to become memory T cells, which are activated by a re-infection, but we don’t know the factors that determine their destiny. Application of our work lies in harnessing the immune system to boost its attack on cancerous tumours and, conversely, dampening down the immune response to treat autoimmune diseases.

Diabetes and Transcription Factors

**Group Leader:** Dr Jenny Gunton

The causes of beta-cell failure are not well understood, but we know there are changes in these cells’ gene expression that can yield clues about what is going wrong. Through the use of a variety of tissue-specific knockout and transgenic mice we hope to identify why beta-cell failure occurs as well as ways to improve beta-cell function and thereby treat human diabetes. We are currently focusing on a gene called ARNT, which is decreased by 90% in the beta-cell containing islets of people with type 2 diabetes. It seems to be a master gene that controls other genes involved in beta-cell function, including glucose breakdown and insulin production. We are now looking at ways to control ARNT.

Gene Therapy and Autoimmunity

**Group Leader:** Dr Shane Grey

Our laboratory is interested in the how and why of the immune system’s attack on the body’s tissues as it occurs during the rejection of organ grafts and in autoimmune disorders like Type I diabetes where the insulin-producing beta-cells are destroyed. Approaches include examining factors that regulate the immune attack on our own cells and investigating the molecular changes that occur in the tissue being attacked in the hope of, one day, being able to genetically engineer tissues that could withstand the assault. This strategy would alleviate the need for the toxic immunosuppressive drugs currently required to promote successful organ transplantation and, in the case of Type I diabetes, enable creation of a ‘death-defying’ beta-cell as a novel cure.
Immunobiology
Group Leader: Dr Stuart Tangye

Our focus is on understanding the development of B cells – the population of white blood cells responsible for the production of protective antibodies - and the regulation of antibody responses. We are particularly interested in understanding how the immune system responds to infections or vaccinations that provide us with a ‘memory’ of the response so that we cope faster and more efficiently following subsequent exposure to the same infectious agent. The development of immunological memory involves interactions between B cells and “helper” T cells – another subset of immune cells. Thus, a major focus of our work is to understand exactly how helper T cells instruct B cells to produce antibodies. We also study several genetic conditions of the immune system that result in immunodeficiencies - disorders whereby affected individuals are unable to mount appropriate immune responses following exposure to some infections or pathogens. These diseases include X-linked lymphoproliferative disease, common variable immunodeficiency and hyper-IgE syndrome. Overall, we hope to identify strategies to improve the immune response in individuals with immunodeficiencies and, conversely, ways in which the immune system of patients with autoimmune diseases could be attenuated.

Mucosal Autoimmunity
Group Leader: Dr Cecile King

In Type 1 diabetes, the insulin-producing beta cells of the pancreas are destroyed by self tissue-destructive T cells. These cells express markers that help us to determine, for example, their dependence upon growth factors and where they have been in the body. We are particularly interested in the relationship between the cells that cause Type 1 diabetes and other autoimmune diseases that develop at the mucosal interface between our bodies and the environment. Broad-based suppression is commonly used to treat autoimmune diseases and transplant recipients but it has an obvious drawback since we need a functioning immune system in order to thrive. The aim of our research is to identify target molecules for selective suppression of these self-tissue-destructive cells.

Antibody Engineering
Group Leader: Dr Daniel Christ

Our laboratory is working on the development of novel antibody therapeutics. In particular, we are interested in the engineering of human antibody fragments, which are considerably smaller than current monoclonal antibodies. Human antibody fragments (such as domain antibodies) can be generated by genetic engineering technology, completely bypassing the use of animals. Thus, these fragments can be produced in large quantities in bacteria and open up promising new routes for non-intravenous applications, imaging and therapy. We are applying our technology to targets in cancer and inflammatory diseases.
Osteoporosis affects nearly a quarter of the entire population over 60, which is a staggering figure. My ultimate dream is to offer these people a treatment that could reverse the ageing process in bone and restore its strength. If we are able to achieve in people what we have achieved in the lab, it would prevent a lot of suffering. It is that hope that drives me.
Dr Paul Baldock
Leader Bone Regulation Research Group

Developed a world-first graphically-based prognostic model for estimating the individual risk of hip fracture in men and women

Characterized a mechanism to stimulate the activity of bone stem cells leading to greater production of bone

Demonstrated the major increase in premature mortality after osteoporotic fractures in both men and women and identified the importance of bone density and its loss, as well as weight loss, for this outcome

Linked genetic changes in vitamin D receptor activity to a pathway that is essential to bone growth, in addition to vitamin D’s already known effects on calcium absorption

Showed that an initial trauma fracture (of any bone in the body) increases the risk of subsequent fractures, particularly in men

Identified a receptor in bone that links signals in the brain to increased bone mass and strength, indicating a potential therapeutic target (a collaborative project with the Garvan Neuroscience Program)

Initiated a collaboration with orthopaedic surgeons at The Children’s Hospital at Westmead to investigate the mechanism behind congenital tibial pseudarthrosis, the leading cause of leg amputations in children

Published the world-first estimate of the residual lifetime risk of fracture using long-term data with adjustment for mortality

Clarified the contribution of genetic factors to bone loss and fracture risk, and developed prognostic models that incorporated genetic information

Introduced the Bayesian statistical approach in the field of osteoporosis, with an analysis of the association between cholesterol-lowering drugs and bone fracture risk

Determined the risk factors for fragility fracture among men and women without obvious osteoporosis
Professor John Eisman was appointed co-Chair of the Arthritis and Osteoporosis Expert Advisory Committee (AOEAC) to the Department of Health that arose from the highly successful National Arthritis and Musculoskeletal Conditions Advisory Group. This committee advises the Department of Health on the continuing funding that has now been provided for improvements in osteoporosis and arthritis healthcare in Australia.

Professor Eisman also chaired the development group for Guidelines for Osteoporosis Management supported by the Federal Department of Health through the Royal Australian College of General Practitioners. Working with an Expert Group within Australia, the first draft of these guidelines was completed and sent out to expert review both within and outside Australia.

Professor Eisman was invited to Japan in 2007 to present at the 25th Annual Meeting of The Japanese Society for Bone and Mineral Research, Osaka and at the University of Tokyo and the Teijin Institute of Biochemical Research.

Associate Professor Tuan Nguyen was awarded a Senior Research Fellowship by the National Health and Medical Research Council.

Professor Eisman was appointed Chair of the Local Organising Committee for the International Bone and Mineral Society to meet in Sydney in 2009. He was also appointed to the international Meetings Committee of this Society.

Dr Paul Baldock was invited to present at a Symposium to the Australasian Paediatric Endocrinologist Group (APEG) Annual Meeting in Broome and invited to give a Symposium Presentation at the 2008 European Society for Clinical Investigation in March. He was also invited to present at the Seminar Series of two leading research institutions: the ANZAC Institute (Sydney) and the Diamantina Institute (Brisbane).

Associate Professor Nguyen and Dr Nguyen Nguyen were invited to Vietnam in July to speak at a conference on osteoporosis in Ho Chi Minh City organised by the Vietnamese Association of Osteoporosis. They launched their book *Osteoporosis: epidemiology, diagnosis, treatment and prevention* at this time. They also conducted training workshops on research methodology for medical researchers at the University of Medicine and Pharmacy, Ho Chi Minh City and organised another training course on epidemiologic methods at Kien Giang Hospital, for postgraduate students and doctors from the Mekong Delta region.

Associate Professor Nguyen was invited to give a lecture at the Strong Bone Asia conference (Thailand). He also served as a rapporteur for the Conference charged with the responsibility of drafting the Asian Recommendation Statements on the prevention and treatment of osteoporosis in Asia.

Associate Professor Nguyen was also invited to join the editorial board of the *Journal of Clinical Endocrinology and Metabolism*, and to serve as an Associate Editor of the recently established journal *BMC Research Notes*.

Dana Bluc and Bich Tran received Young Investigator Awards for their work at the American Society for Bone and Mineral Research 2007 conference in Hawaii.
PROGRAM SUMMARY

Osteoporosis affects older men and women. It brings with it major costs to the individual and community, serious impacts on being able to live productively and premature mortality. As prevention is the best strategy for reducing this large human and financial burden, we need to improve our knowledge of the risk factors from fracture; find ways to better assess treatments; increase our understanding of bone biology; and help identify new treatment possibilities.

Population, individual and genetic determinants of osteoporotic fracture risk and their outcomes

**Group Leaders:** Associate Professor Tuan Nguyen, Dr Jackie Center, and Professor John Eisman

Our research draws on the Dubbo Osteoporosis Epidemiology Study (DOES), which began in 1989 and is the world’s longest running large-scale epidemiological study of osteoporotic fractures in men and women. We are using the DOES data to develop predictive models, based on multiple risk factors, to identify men and women at high risk of fracture and to determine who would benefit most from preventative interventions. We are also continuing to search for new osteoporosis genes that may predict those who are at low risk of osteoporosis and fractures – taking into account environmental factors such as physical activity, dietary habits, medication, fall-related and hormonal factors. Finding and understanding how these genes work and interact with other known genes will help identify targets for novel therapies. Much of this work makes use of transgenic mouse models and is carried out in collaboration with researchers in the Neuroscience Program.

Bone Regulation

**Group Leader:** Dr Paul Baldock

The hallmark of osteoporosis is a reduction in bone density and therefore strength. It is caused by an imbalance between bone formation and bone loss. Our group is, primarily, investigating the role of brain hormones, which influence bone formation and strength. Much of this work makes use of transgenic mouse models and is carried out in collaboration with researchers in the Neuroscience Program. The effect of this pathway on bone is larger than any previously reported and this suggests a major approach to new treatment.

Fracture Prevention - Clinical Studies

**Group Leader:** Professor John Eisman

Our clinical studies group participates in multicentre international clinical trials evaluating potential osteoporosis treatments that are in the final stages of pharmaceutical development. We recruit patients and volunteers who have had a fracture or who have a family history of osteoporosis. Volunteer participants who meet specific risk criteria are randomly allocated to receive a new drug or various combinations of drugs.
MY GOAL RIGHT NOW IS TO SUCCESSFULLY COMPLETE MY PHD, WHICH MEANS CONTRIBUTING NEW KNOWLEDGE ABOUT HOW THE BRAIN INFLUENCES THE FORMATION OF BONE. I WORK AT THE CELL LEVEL, RESEARCHING CERTAIN RECEPTORS IN BONE CELLS. EVENTUALLY I'M HOPING TO UNDERSTAND MORE ABOUT THE MECHANISMS BEHIND THE WAY BONE CELLS RESPOND TO SIGNALS FROM THE BRAIN. OBVIOUSLY, IT WOULD BE GREAT IF SOME THERAPEUTIC BENEFIT WERE TO COME OUT OF THIS WORK.
Discovered that adult olfactory stem cells can give rise to new hearing-like cells that are lost in acquired deafness, and so offer the potential to restore hearing in the future.

Found that macrophage inhibitory cytokine-1 (MIC-1), a molecule released in high quantities by tumours, acts on the hypothalamus of the brain to inhibit appetite and reduce body weight, providing new hope for the treatment of cancer-related anorexia and obesity.

Showed that overexpression of peptide YY, a hormone released in the gut after eating a meal, reduces fat levels long-term and so may be suitable for use in regulating appetite and weight.

Demonstrated in mice that dynorphins, natural opioid-like peptides that regulate mood, also control weight. This may explain why people genetically predisposed to produce high levels of dynorphins store fat more easily and find it hard to lose weight.

Discovered that Y1 receptors play a coordinated role in the regulation of bone and fat tissue, paving the way for novel treatments for osteoporosis and obesity.

Showed that the TGF-beta super-family is a critical regulator of new nerve cell growth in the brain, which suggests a potential therapeutic approach for treating neurological diseases such as Alzheimer’s disease and spinal cord disorders.

Analysed dopamine release rates from synapses, allowing us now to investigate the mechanisms that are critical in Parkinson’s disease.

Professor Herbert Herzog was an invited speaker at two conferences in New Zealand, the Australasian Neuroendocrine Conference 07 and the Endocrine Society of Australia (ESA) & Society for Reproductive Biology (SRB) Annual Scientific Meeting, as well as one conference in Porto, Portugal. He was also an invited speaker at the Human Frontier Science Program (HFSP) 7th Annual Awardees Meeting in Brisbane.

Dr Amanda Sainsbury-Salis was awarded a highly-competitive Career Development Award from the National Health and Medical Research Council and was selected by the International Association for the Study of Obesity (IASO) to co-chair an international conference entitled Sex and obesity: gender differences in energy homeostasis and fat metabolism to be held in Bangkok, Thailand.

Dr Sharon Oleskevich hosted the international symposium, Advances in Hearing Research, at Garvan and was an invited speaker at the Australian Course in Advanced Neuroscience, Moreton Bay Research Station, North Stradbroke Island, Queensland.

Dr Bryce Vissel was an invited speaker at two international meetings, the International Brain Research Organization Satellite Meeting on Glutamate Receptors and the International ASCEPT-SEAWP Meeting on Glutamate Receptors in Adelaide. Dr Vissel also spoke at UCLA on learning & memory.

Dr Vissel contributed to the establishment of ANZCIN, a peak body directed to unified and optimal spinal cord treatments and clinical trials in Australia.
The Neuroscience Research Program aims to increase our understanding of the neuronal systems involved in disorders such as Parkinson’s disease, Alzheimer’s disease, schizophrenia, eating disorders, and hearing loss. We aim to identify new therapeutic approaches for these diseases with a special interest in regeneration of the nervous system for therapeutic purposes. A key focus is the better understanding of the brain’s control of energy homeostasis (balancing energy intake and expenditure), which affects fertility, mood, and weight gain.

Adult Stem Cell Research

Group Leader: Professor John Shine

Neural stem cells can be isolated from the adult olfactory neuroepithelium (situated in the nose) and grown in the laboratory in the form of olfactory neurospheres. These structures are three-dimensional aggregates of cells that are able to grow into neuronal and non-neuronal cells. The identity of the cell type within the olfactory neuroepithelium that gives rise to these neural stem cells remains elusive. Our group studies the basic biology of adult olfactory stem cells with the aim of identifying, isolating and propagating these cells and to determine the conditions needed to transform them into the different types of nerve cells found in the brain, for example, those lost in Parkinson’s or Alzheimer’s disease.

Eating Disorders Research

Group Leaders: Professor Herbert Herzog and Dr Amanda Sainsbury-Salis

One of our laboratory’s major goals is to understand how appetite and body weight are regulated. Defects in the brain pathways that regulate these processes may be responsible for causing wasting conditions such as anorexia nervosa and cancer cachexia as well as the metabolic resistance to weight loss occurring in overweight or obese people.

Our main focus is on neuropeptide Y (NPY) and its Y-receptors, since many of the molecules that regulate appetite and body weight do so via this system. Our research findings have implications for the treatment of obesity, infertility, poor lactation, dwarfism, and osteoporosis, as well as anorexia nervosa and cancer cachexia.

Hearing Research

Group Leader: Dr Sharon Oleskevich

Our research is focused on the use of adult stem cells to repair hearing loss. After successfully demonstrating that adult olfactory stem cells can transform into hearing cells, and developing microsurgical techniques for inner ear transplantation, we are now injecting stem cells into the cochlea of deafened mice. Specialised hearing tests are in place to examine whether transplantation results in a functional recovery of hearing. Additional sources of adult stem cells (vestibular and tongue) are being explored.

Our animal studies are currently being extended to examine whether adult human stem cells can act as a source of new hearing cells. Adult human stem cells are collected in collaboration with ear, nose and throat surgeons at St Vincent’s Hospital, and will be injected into deafened mice in an effort to repair hearing loss.

Neurodegenerative Disorders – Repair & Regeneration

Group Leader: Dr Bryce Vissel

Our ultimate goal is to understand how we can harness the brain’s own stem cells and/or modulate nerve cells’ connections (i.e. how we can harness neural plasticity) to help treat Parkinson’s disease, Alzheimer’s disease, spinal cord injury and motor neurone disease, all of which are devastating neurodegenerative diseases. We study how abnormal signalling at nerve cell junctions contributes to these movement and memory disorders and we work to understand why the nervous system’s own repair systems, i.e. the formation of new nerve cells, is ineffective in these conditions. We hope to find novel treatments that will profoundly impact people with brain diseases.
IT NEVER CEASES TO AMAZE ME HOW B CELLS MAKE ANTIBODIES THAT SO EFFECTIVELY ATTACK INFECTIONS BUT ONLY RARELY MAKE THE MISTAKE OF ATTACKING US. EACH B CELL IS DIFFERENT AND THE FATE OF EACH ONE DEPENDS ON ITS POTENTIAL TO PROTECT US OR HARM US. I HOPE TO UNDERSTAND THE MANY COMPLEX DECISIONS MADE BY B CELLS AND WHY SOMETIMES THE WRONG CHOICE LEADS TO AUTOIMMUNE DISEASES SUCH AS LUPUS.

Dr Robert Brink
Leader B Cell Immunobiology Research Group
AUTOIMMUNITY RESEARCH UNIT
Discovered a new form of lupus in mice which may correspond to a conventional treatment-resistant form of lupus in humans and suggests alternative kinds of treatment for some people.

Identified a new molecule known as CXCR7 that may explain why some children are born with holes in their hearts or faulty heart valves.

Found that the TRAF2 and TRAF3 genes inside our B cells maintain a healthy balance within our immune systems when functioning normally, yet may trigger cancers and autoimmune diseases when perturbed.

Identified genetic regions containing diabetes susceptibility genes associated with the pathogenic action of B cells.

Analyzed new genes that determine the levels of NKT cells in mice, an important immune cell population that is able to prevent certain autoimmune diseases and cancers.

Expanded our knowledge of new genes that confer susceptibility to pernicious anaemia, an autoimmune disease targeting cells of the stomach.

Performed whole genome expression arrays on B cells from diabetic mice and non-diabetic mice to aid identification of new genes that may contribute to the pathogenic activity of B cells causing type 1 diabetes.

Professor Fabienne Mackay was an invited keynote speaker at the 2007 Annual Rheumatology Meeting in Dunedin New Zealand and co-organised the 11th TNF Congress in Asilomar Monterey USA where she presented in a plenary session. Professor Mackay was also one of the main speakers invited to the celebration of the 50th anniversary of Nobel Prize winner Sir MacFarlane Burnet’s clonal selection theory at the Walter and Eliza Hall Institute in Melbourne.

Professor Mackay, Dr Robert Brink and Dr Pablo Silveira organized the 4th Australian B cell dialogue, which was held for the first time at the Garvan Institute. They also organised the Australasian Society of Immunology meeting in Manly, NSW, which attracted 560 delegates from overseas and the South Pacific region.

Priya Rao, an Honours student in the lab, was awarded a UNSW University Medal for her work overall and, in particular, her study on stress and asthma.

Garvan PhD student, Sandra Gardam, was awarded a prestigious New Investigator Award at the annual conference of the Australasian Society of Immunology for her research on B cells.

Professor Mackay was appointed as a Director of the NSW ASMR (Australian Society of Medical Research) and was appointed as NSW representative for NARF (National Association of Research Fellows) – regarding NHMRC fellowships.

Lewis Cox, a postgraduate researcher in Dr. Silveira’s laboratory, was awarded two travel grants from the JDRF and Immunology of Diabetes Society (IDS) to present his work on B cells that recognize beta cell proteins in various overseas institutes as well as the International Congress for the IDS meeting.
Autoimmune diseases affect approximately one in twenty people. For some unknown reason, they affect almost three times as many women as men. Almost all autoimmune diseases appear without warning and can have serious consequences on morbidity and quality of life. They are the result of our immune system mounting a response against our own body. More than forty human diseases are defined as having autoimmunity as their definitive or probable cause and many treatments can be ineffective. Examples include type 1 diabetes, systemic lupus erythematosus (SLE), Sjögren’s syndrome, and Hashimoto’s disease - all of which our Unit investigates.

**Autoimmune Disease Mechanisms**

**Group Leader:** Professor Fabienne Mackay

We have two principal areas of study: the unappreciated role of B lymphocytes in autoimmune diseases - uncovered from our work on the B cell activating factor (BAFF) - and how immune responses are affected by stress. When there is too much BAFF, harmful B cells live longer than they should and can damage healthy tissue. We want to know how the oversupply of BAFF corrupts immune defences to drive autoimmune disorders and why in other conditions it appears to be protective.

Our collaborative research on the link between stress, neuropeptide Y (NPY), and the immune system continues to work towards building a better understanding of the circumstances of NPY release and its effect on immune cells.

Unexpected data with some new B cell molecules had ramifications with heart research and also cancer which are now new areas of focus in the group via collaborations.

**B Cell Immunobiology**

**Group Leaders:** Dr Robert Brink and Emeritus Professor Antony Basten

Autoimmune diseases such as lupus, myasthenia gravis and hemolytic anemia can arise when B cells produce rogue antibodies that attack the body. Our investigations aim to enable us to identify the specific genes and signaling pathways that regulate B cell survival, proliferation, and differentiation; as well as the molecules and cells that drive antibody production against foreign structures and prevent antibody responses against ourselves. By understanding how B cells function we hope to reveal new strategies for improving vaccines, controlling autoimmune disease, and treating B cell malignancies.

**B Cell Tolerance & Autoimmunity**

**Group Leader:** Dr Pablo Silviera

Our ultimate goal is to prevent the immune system attacking the insulin producing beta cells of the pancreas, which leads to Type 1 diabetes. Our research aims to identify the faulty mechanisms that allow the B cells that recognise beta cell proteins to persist and thus activate the destructive T cells. We also aim to identify novel genes that control the generation and function of this aberrant population of B cells, findings that could form the basis for new therapies to prevent or reverse Type 1 diabetes in humans.
I’m a physician doing clinical research into growth hormone – its effects on metabolism and its interaction with sex hormones. I am testing a hypothesis that oestrogen compounds decrease the action of growth hormone, and if I can prove it, that will radically change treatment routines. Ever since I was a child, I wanted to become a doctor. In particular, my dream is to work as an endocrinologist, and so my research here is a step towards that goal.
Completed a large scale 4 year study on the effects of growth hormone on muscle mass and performance in athletes to evaluate new tests for growth hormone doping. This study identified components of the IGF-system and collagen proteins to be the most promising diagnostic markers of growth hormone abuse in sport. We are also developing a test for growth hormone doping based on the detection of gene expression in peripheral blood cells.

Showed that growth hormone can reverse the breakdown of protein induced by glucocorticoids, indicating its therapeutic potential to prevent muscle wasting caused by long-term use of these adrenal hormones.

Discovered that SERMs (drugs that work on the oestrogen receptor) enhance growth hormone signalling, via a novel mechanism involving the suppression of protein tyrosine phosphatases.

In a first study of metabolic genes in muscle, found that growth hormone suppresses energy and fat metabolism, contrary to conventional wisdom, and found that growth hormone regulates circadian genes in muscle, maximising strength and performance.

Participated in collaborative findings that a protein formed from the fusion of growth hormone with a portion of its receptor greatly enhances and prolongs its action.

Morton Burt was awarded a PhD by the University of NSW. He was also awarded the Bryan Hudson Clinical Investigation Award by the Endocrine Society of Australia.

Heather Lee was awarded the Harvey Carey Memorial Scholarship in Medical Science by the University of NSW. Heather also won the Garvan Institute’s PhD Scholar Poster Prize and a travel award by the Endocrine Society of Australia.

Dr Vita Birzniece was awarded a travel grant from the Endocrine Society of Australia.

Dr Akira Sata was awarded an Australian Government Endeavour Fellowship to undertake postdoctoral studies on sex steroid modulation of growth hormone signalling.

Dr Anne Nelson was invited to participate in a growth hormone workshop by the World and US Anti-doping Agencies in Chicago. Her work was selected for special media attention at the 2007 Annual Scientific Meeting of the US Endocrine Society.

Professor Ken Ho was an invited speaker by the Brazilian Endocrine Society, and the International Pituitary Society, was invited to serve on the Editorial Board for Endocrinology and was awarded the Asia and Oceania Medal of the British Endocrine Society for 2008.
The pituitary gland produces key hormones that control body growth, strength, appetite, metabolism, mood and reproduction. An over or under active pituitary gland can lead to a range of diseases from dwarfism in children to infertility, mood disorders, muscle wasting, obesity and diabetes in adults. A major focus is the physiology of growth hormones, in particular understanding how sex hormones interact with growth factors to control body fat, muscle and bone mass.

**Hormones, Metabolism and Health**

*Project Leader: Professor Ken Ho*

The research investigates the role of growth hormone (GH) as a major regulator of body metabolism, composition and health in adult life. Our work focuses on the health consequences of GH deficiency and potential therapeutic application of GH and identifying factors that modulate the action of GH and the health consequences. A major focus is the elucidation of the metabolic impact of sex hormones which our research has shown modify the action of GH. Under active investigation are SERMs which are synthetic oestrogen-like compounds widely used for the treatment of osteoporosis and breast cancer. The work also includes male hormones and their potential application with GH in the treatment of muscle wasting.

Complementary work in the laboratory addresses the cellular and molecular mechanisms by which sex steroids modify the action of GH action and identifying novel GH regulated genes. A parallel project extends to understanding how female hormones interact with prolactin, a pituitary hormone that is structurally related to GH, in the regulation of lactation and mammary development in collaboration with the Development Group of the Cancer Program.

**Growth Hormone Doping**

*Project Leader: Dr Anne Nelson*

This project aims to develop new approaches for the detection of GH doping. Testing for GH is difficult because the GH used in doping is indistinguishable by normal methods, from the GH made by the body itself.

We have recently shown that GH does not increase muscle mass – it puts on more fluid than muscle, and that it has only a small effect on performance even when combined with testosterone. We are evaluating markers of GH and the different forms of GH, called isoforms, for detection of GH abuse. We have found that some of these markers can detect GH for several weeks after GH is taken and that one marker is even more sensitive when testosterone is also used. This should enable more cheats to be detected using these tests. We are also utilising microarray gene profiling and gene pathway analysis to identify novel markers of GH in peripheral blood cells. The aim is to develop a gene fingerprint test based on gene expression profiling of white blood cells.

The Unit participated in meetings to implement GH tests convened by the US Anti-Doping and World Anti-Doping Agencies in Chicago and Lausanne. The Unit has also received major funding worth over one million dollars over 3 years from the World Anti-Doping Agency for the gene expression study.
Biological Testing Facility holds the mouse production colonies and provides specialised zones to enable quality animal-based research. Garvan has recently invested in a $20m breeding and holding facility in Moss Vale that will be used by Garvan as well as other medical research organisations throughout New South Wales.

Dr Jenny Kingham e: j.kingham@garvan.org.au p: (02) 9295 8175

Clinical Research Facility runs Garvan clinical research projects such as those that look at the effect of hormones (e.g. growth hormone, sex steroid hormones, insulin) on different metabolic systems. Staff also monitor volunteers involved in pharmaceutical clinical trials, such as those for osteoporosis medications.

Jennifer Hansen e: j.hansen@garvan.org.au p: (02) 9295 8231

Flow Cytometry Facility comprises high speed cell sorters to allow the separation of up to four populations of cell types from any body fluid or tissue suspension. The pure population of cells, separated on the basis of multiple phenotypic and functional characteristics, can then be grown as pure cultures, used to extract RNA or DNA for genetic analyses, or implanted into animal models, for functional assays and therapeutics.

Dr Jerome Darakjian e: jerdar@garvan.org.au ph: (02) 9295 8432

Pieter Huveneers Molecular Imaging Facility consists of a number of state-of-the-art microscopes which, using a variety of fluorescence based techniques, are capable of imaging tissue, cells, intracellular organelles and even multiple individual molecules in live cells. Using techniques such as Total Internal Reflection Fluorescence (TIRF) microscopy we are able to image events occurring on or near the surface of a cell. Using laser scanning confocal microscopy we can precisely image ‘slices’ of samples which can be reconstructed into a 3D representation for analysis. These provide our scientists with the best possible means of identifying where and when molecules of interest are in normal tissue and how this may differ in disease.

Dr Will Hughes e: w.hughes@garvan.org.au p: (02) 9295 8232

Peter Wills Bioinformatics Centre applies techniques derived from disciplines such as applied mathematics, statistics and computer science to understand, organise and analyse biological data. This includes the housing of both clinical and microarray data, and the building of computer programs for querying and analysing these datasets. Examples of these programs include CanSto for managing clinical cancer data, Stuart for animal records management and Garvan’s GeneSpring WorkGroup—a microarray archiving and analysis environment. CanSto is used across Australia by the Australian Prostate Cancer Collaboration for all clinical information management. Garvan’s GeneSpring WorkGroup server houses microarray experiment results for researchers across Australia.

Mr Jim McBride e: j.mcbride@garvan.org.au p: (02) 9295 8145

Technology is an important component of being competitive in medical science. Garvan’s core research facilities contain state-of-the-art equipment that enables our scientists to perform the necessary experiments to better understand disease processes. Highly trained managers oversee each of the facilities, which are also available to external researchers.

Australian Cancer Research Fund (ACRF) Unit for the Molecular Genetics of Cancer houses equipment that can detect and analyse genetic sequence variations such as gene losses, mutations, expression, and methylation on a large scale. It is used by cancer researchers throughout the state.

Pavel Bitter e: p.bitter@garvan.org.au p: (02) 9295 8384 or Prof Susan Clark e: s.clark@garvan.org.au p: (02) 9295 8315

Gene Chip Facility contains the Affymetrix Microarray System that is used to compare the levels of gene transcripts in tissue samples. It is used to find potential genes of interest, the subsets of which can then be further analysed in the ACRF Unit that can handle large numbers of samples. Garvan was the first in Australia to establish the system.

Professor Charles Mackay e: c.mackay@garvan.org.au p: (02) 9295 8402 or Blanche Woehl e: b.woehl@garvan.org.au p: (02) 9295 8452

Pieter Huveneers Molecular Imaging Facility
It’s inspiring to work in an environment like Garvan. I feel very privileged and know that I measure my own work by what the scientists are achieving. I also believe that the smooth functioning of all support services is critical to the institute’s success.

Cherry Dutton
Finance Manager
Garvan
Commenced the building of our new animal breeding facility in Moss Vale, Australian BioResources (to be completed June 2008). The facility was designed to provide capacity to house animals for NSW universities and medical research facilities. The state-of-the-art operation is an ideal environment for animals, relieving space constraints at Garvan.

Factored many “green” design elements, such as solar panels, into the Moss Vale facility, covering energy efficiency, water use, recycling and waste disposal.

Tested and modified the Australian-made and developed caging systems for mice in preparation for the opening of the Moss Vale facility. Testing ensured that all design features were optimal for the animals (for example the drinking bottles in cages) and observed strict OH&S guidelines for their human handlers.

Met the increasing demand for high quality experimental animals by importing 60 new lines, or strains, of mice and expanding our breeding facility at Garvan by another 600 cages.

Opened de novo, a beautifully appointed café for staff, creating an environment conducive to thought and interaction.

Re-launched the OHS & Compliance intranet site, with all information reviewed and updated to further improve Garvan as a safe working site.

Welcomed the Diabetes Vaccine Development Centre (DVDC) into Garvan. DVDC was established to translate scientific research into the development of products to prevent or delay the onset of Type 1 diabetes, a goal which aligns well with our diabetes research.

Moved the Australian Cancer Research Fund (ACRF) Unit for the Molecular Genetics of Cancer to Level 7, acknowledging its growing role within the St. Vincent’s precinct and allowing for expansion.

Upgraded to an online, self-serve, leave and payroll system, allowing staff to view and manage salary and leave entitlements.

Reached a staffing level of over 430.

Replaced the internal calendaring system that runs the timetable for all scientific tools, meeting rooms and personal calendars, linking it to Garvan mobile phones for a complete mobile communications solution.

Contracted IT to meet the needs of the 60 researchers at St. Vincent’s Centre For Immunology (CFI), bringing the total number of researchers and administrative staff supported by IT to over 600.

Released a new version of the Stuart system for management of animal breeding, critical to the operation of breeding in Moss Vale, as well as adding significant value to the way researchers manage and plan their animal research.
Updated in-house research systems Tracka, FunnyBone and CanSto_Prostate, adding value to the management of research information. Also added new components to the information architecture to support dynamic forms and barcode scanning equipment.

Launched a new public website, making information about Garvan research more accessible to a broader audience.

Improved our internal communications with a regular web-based newsletter to keep all staff abreast of Garvan and research news.

Hosted a PhD student open day, attracting around 60 prospective research students.

Managed 193 new and ongoing research grants from Australian and overseas funding organizations.

Negotiated an agreement to provide access for Garvan staff to the Kira Child Care Centre in nearby Paddington.

Completed several agreements with international biotech companies for technology relating to treatment of epilepsy and diagnosis of neurodegenerative disorders.

Expanded the business development team with the addition of two new senior business development managers.

Championed and joined the Medical Research Commercialisation Fund, a $30m pre-seed fund, specifically established to invest in early stage research generated by NSW and Victorian medical research institutes.

Expanded the technologies available to Garvan researchers by establishing applied collaborations with the Australian Nuclear Science and Technology Organisation to access imaging, and the Walter & Eliza Hall Institute and Eskitis (Griffith University) for screening of drugs to genetic targets identified by Garvan researchers.
Overview

The Business Development team, under the leadership of Christina Hardy, collaborates with the pharmaceutical and biotech sector and partners with other academic organisations to take Garvan’s research discoveries one step closer towards new treatments and diagnostic tests.

Working closely with Garvan scientists, the Business Development team is responsible for all aspects of commercialisation from monitoring research activities to maximising early capture of intellectual property, identifying pharma/biotech market opportunities, and negotiating and managing commercial agreements. Importantly, the Business Development team establishes applied collaborations with organisations who have additional capabilities which greatly increase the potential for Garvan’s breakthroughs to be developed for clinical use.

The Garvan patent portfolio comprises 37 patent families covering therapeutics, diagnostics and screening categories.

G2 Therapies and Novo Nordisk

G2 Therapies is a private company, chaired by Dr John Schubert, which develops and commercialises antibody-based therapeutics for inflammation. Founded at Garvan in 2002, major investors include AMWIN, and Baron Nominees.

In early 2006, G2 announced the signing of a major research, development and licensing agreement with Danish healthcare company Novo Nordisk. The terms of the agreement include an upfront payment, success-based payments to a potential total of around US$100 million, and royalties on commercialised therapeutics.

Novo Nordisk and G2 therapies hope to advance their lead anti-C5aR monoclonal antibody to human clinical trials in the near future. Anti-C5aR antibody treatment holds promise for a number of inflammatory conditions including lupus, rheumatoid arthritis and other autoimmune diseases.

Business Development Advisory Council

The Business Development Advisory Council (BDAC), a strategic advisory group to the Business Development Unit, includes several representatives from the biotech and pharmaceutical industries.

Dr Lisa McIntyre (Chair)
Director, L.E.K. Consulting

Bill Ferris AC,
Garvan Institute of Medical Research Chairman,

Professor John Shine AO FAA,
Executive Director, Garvan

Paul Bell,
External Director

Peter Carre,
CEO, Burrill Australia

Christina Hardy,
Director, Business Development & Legal Affairs, Garvan

John Dakin,
Chief Operating Officer, Garvan

Dr Sue Henshall,
Group Leader, Cancer Research Program
THE RITCHIE FAMILY HAS BEEN VERY FORTUNATE. OUR INVOLVEMENT IN CHARITY GIVES US ALL AN OPPORTUNITY TO CONTRIBUTE BACK TO THE COMMUNITY. SUPPORTING MEDICAL RESEARCH IS AN INVESTMENT IN FUTURE GENERATIONS AND A BETTER QUALITY OF LIFE FOR EVERYONE. THE GARVAN INSTITUTE EXEMPLIFIES THE PHILOSOPHY OF OUR FAMILY’S CHARITABLE FOUNDATION: TO SOLVE MEDICAL PROBLEMS THAT AFFLICT SO MANY ORDINARY AUSTRALIANS, FOR YEARS TO COME.

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Garvan Life Governor
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Amgen Australia
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ARC/NHMRC Network: Fluorescence Applications in Biotechnology and Life Sciences (FABLS)
Armati Family
Ascham School
Association for International Cancer Research
AstraZeneca
Australia Post
Australian Academy of Science
Australian Deafness Research Foundation
The Australian Ladies Variety Association Inc
Australian Research Council
Australian Rotary Health Research Fund
Australian Rotary Health Research Fund, Rotary District 9650
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Department of Foreign Affairs and Trade
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Shelagh and Malcolm Irving
Mr & Mrs M Isaacs
JPMorgan Australia Limited
Dr Sue Jacobs
The Hon Justice Peter M. Jacobson
The Jenour Foundation
John & Connie Kennedy Charitable Trust
John Lamble Foundation
John Sample Group Pty Ltd
Mrs Sheila M Johnstone
Jointventure
Dr G Jordan
Juvenile Diabetes Research Foundation
K Capital Pty Ltd
Mrs Virginia Kahlbetzer
Mr & Mrs Leon & Alicia Kawalsky
Mr & Mrs Patrick & Beryl Keane
Mrs Gwen Keir
Mrs Helen Keir
Professor Geoffrey Kellerman AO
Mr T Kennedy AM & Mrs C Kennedy
Mr Steve Kennedy
Mr David Kerr
Mr Ralph and Mrs Lorraine Keyes
Mrs A Kirby
Jean Kirk
Mr W Bruce Kirkpatrick & Mrs Juliet Kirkpatrick
Kokoro Paradigm Pty Ltd
Mrs Zoe Kominatos
KPD PTY Limited
Gilles Kryger
L & H Payne Medical Research
Charitable Foundation
LGT Schweizerische Treuhandgesellschaft
The Lady Proud Foundation
Landerer & Company Solicitors
In Memory of Michael Ison Large
Ms Helen Lee
Mr Robert Leece AM RFD
Leighton Holdings Limited
Mrs Linda Leupen
Lidia Perin Foundation
Link Market Services Limited
Ms Janet P Linnell
Lloyd-Jones Meakin Group
Lord Mayor’s Charitable Fund (Melbourne)
Mr Michael Lowe
Mr David Lubowski
Mrs Joyce Sproat & Mrs Janet Cooke
Ms Maria Lydaki
Ms Helen Lynch AM
Mrs Ann Macintosh
Mr Ewan MacPherson
Macquarie Goodman Foundation
Macquarie Group Foundation
Macquarie Bank Limited
Macquarie Portfolio Investments Pty Limited
Mallesons Stephen Jaques
The Mandarin Club
Mr R & Mrs S Maple-Brown
Mr David Marshall
Mr & Mrs Les & Lyn Matheson
The Hon John & Mrs Dympna Matthews
Maunsell Australia Pty Ltd
MBF Living Well Foundation
Sir Ian McFarlane
Mr Peter McGovern
Mrs Pamela McNamara
Megisti Property Group
Mrs Mabs Melville
Merck Sharp & Dohme Limited
Mr John Mesley
Dr Anthony P Millar OBE
Neill & Kathy Miller
Mirvac Limited
MLC Limited
Geoff & Jan Moles
Mr Warren Morley
Motor Neurone Disease Research Institute of Australia
Multiple Sclerosis Research Australia
Mr S Murray
National Australia Bank
National Breast Cancer Foundation
National Health and Medical Research Council
National Institutes of Health (USA)
Mr James Nilson
Mr W Brian Northam
Novartis Pharmaceuticals Australia
Novo Nordisk
NSW Office for Science and Medical Research
NSW State Government Spinal Cord and Related Neurological Diseases Grants Program
Mr Michael O’Dea AM & Mrs Marianne O’Dea
Mr J O’Farrell
Dr Graham O’Neill
Order of the Amaranth
Order of the Eastern Star - Illawarra District
Grand Chapter
Pace Foundation Pty Ltd
Pacific Equity Partners
Paramor Family
Park Hyatt Sydney
Mr Roger Parker
Dr Michael Pasfield
Ian Paul
Mrs Angela Pearse
Arvid & Karen Petersen
The Petre Foundation
Pfizer Australia
Pfizer Global Research and Development
Pfizer International
Mr M John Phillips AO
Carol and Steve Rogers Memorial Charity Day
Mr V John Plummer
Mr John Porter
Premier Media Group
Prostate Cancer Centre, St Vincent’s Hospital
Prostate Cancer Foundation of Australia
Public Trustee NSW
Mrs Colleen Quinton
Janaki Ramachandran
Mr Ian Rank
Mr & Mrs Mark & Kristin Ranucci
Rebecca L Cooper Medical Research Foundation
Mr Jean Redman
Retire-Ease Financial Planning
The Ritchie Family
Mrs R Roberts
Mr Stephen Roberts
Roche-GSK
The Rodney & Judith O’Neil Foundation
The Ronald Geoffrey Arnott Foundation
Roselands Golden A Club
Roselands VIP Club
Ms Roslyn Ross
Henry H. Roth Charitable Foundation
The Royal Bank of Scotland
Royal College of Pathologists Australia
Royal Hospital for Women
Mr David Ryan
Mr James Ryan
Mrs Lyn Ryder
Mr Kevin & Mrs Judy Ryrie
Celia and Rose Saba
Sanofi-aventis
Mr D & Mrs A Saul
Dr Garry Scarf
Mr Ian Schlipalius
Ms Clare Self
Servier
Mrs J Shanahan
Mrs D Shannon
Mr Peter Skellem
Joseph Skrzynski AO & Roslyn Horin
Mr M Slavich
Dr C M Smith
Mrs J M Smith
Mrs Shirley Smyth
Mr Ezekiel Solomon
Mr & Mrs David & Audrey Solomon
St Vincent’s Clinic Foundation
Mr Keith & Mrs Margaret Steele
Miss Alison Stephen
Stiftung Foundation
Mr Paul Sumner
Susan G Komen Breast Cancer Foundation
Susannah Sweeney
Sydney Airport Ladies Association
Mr Nick Tait OBE & Mrs Mimi Tait
Miss Audrey Taylor
Mrs Lilian Thomas
Thomas Hare Investments Limited
Mrs Susann Trevena
Trust Company Limited
Turnbull Ossher Design
University of NSW
Mr Ian Vale
Vittoria Coffee
John & Megan Wade
Mrs Caroline Walder
Mrs Helen Walker
Lang & Sue Walker & Family
Ms Alexandra Wedutenko
Westpac Banking Corporation
Mr Stuart White
Mr Alan Whitfield
E J Whitten Foundation
Mr Harry Widdup
Mr Chris Wilkinson
Dr J Wilson
In Memory of the Late Kathrin Nell A Wilshire
Witchery
Mrs Jackie Wong
Wood Family Foundation
Mr J & Mrs L Woolf
World Anti-Doping Agency (WADA)
Wyeth Consumer Healthcare Pty Limited
Mr D Xu
Mr R W Young
Mr S Young

2007 Garvan Bequests
Estate of the Late Patricia A Bradley
Estate of the Late Gordon Richard Chrisp
Estate of the Late Lindsay H Franks
Estate of the Late Sonya James
Estate of the Late Marjorie Grace Lawn
Estate of the Late Alfred Charles Moore
Estate of the Late Phyllis Maude O’Hanlon
Estate of the Late Mrs F Rosenberg
Estate of the Late Mrs June Kathleen Russell
Estate of the Late Babette Josephine Ryan
Estate of the Late Charlotte M H Trunshneg

Estate of the Late Patricia A Bradley
Estate of the Late Gordon Richard Chrisp
Estate of the Late Lindsay H Franks
Estate of the Late Sonya James
Estate of the Late Marjorie Grace Lawn
Estate of the Late Alfred Charles Moore
Estate of the Late Phyllis Maude O’Hanlon
Estate of the Late Mrs F Rosenberg
Estate of the Late Mrs June Kathleen Russell
Estate of the Late Babette Josephine Ryan
Estate of the Late Charlotte M H Trunshneg
GOVERNANCE
Garvan Institute Board

Bill Ferris AC
Chairman
Nominated by the Trustees of St Vincent’s Hospital
Bill Ferris is Executive Chairman of the CHAMP Private Equity Group, one of Australia’s leading private capital groups, providing venture capital, expansion capital and management buyout funding in Australasia.
Mr Ferris is currently Chairman of International Energy Services Pty Ltd and the Garvan Institute of Medical Research. Former directorships include: Chairman, Australian Trade Commission (Austrade) and Austar United Communications Limited, Director, Bradken Resources Pty Ltd, Tucker Seabrook (Aust) Limited, and Australian Pacific Paper Products Pty Ltd. He is also a Director of the Garvan Research Foundation.

Nicholas Curtis
Nominated by the Trustees of St Vincent’s Hospital
Nicholas Curtis has a background in investment banking and the resources industry. He is Executive Chairman of Lynas Corporation Limited, an Australian public company specialising in rare earths. Mr Curtis was appointed as Chairman of the Board of St Vicents & Mater Health Sydney in August 2004 and also serves as a Director of the Sisters of Charity Health Service.

Martin Hoffman
Treasurer
Nominated by the Sisters of Charity
Martin Hoffman is CEO of Loop Mobile Limited, a listed provider of mobile chat and community services internationally. Prior to that he was Chief Executive Officer of ninemsn, a 50:50 joint venture between Microsoft and Publishing & Broadcasting Limited (PBL). Before joining ninemsn in February 2003, Martin Hoffman held a number of senior roles with John Fairfax Holdings Ltd.

Mary Foley
Nominated by the Sisters of Charity
Mary Foley is Chief Executive Officer, St Vicents & Mater Health Sydney. Previous positions include Deputy Head, NSW Department of Health and Executive Director, NSW Office of Health Policy and senior executive management positions for Mayne Nickless private health care business. Ms Foley is Deputy Chancellor and a member of the Board of Trustees, University of Western Sydney. Ms Foley was NSW Telstra Businesswoman of the Year in 1998 and was awarded the Centenary Medal in 2003 for service to Australian society in business leadership. She is also a director of the Victor Chang Cardiac Research Institute, the St Vincent’s Research Precinct and Garvan Research Foundation.

Graham J Bradley
Nominated by Garvan Research Foundation
Graham Bradley is a professional company director. Mr Bradley is Chairman of Stockland Corporation Limited, HSBC Bank Australia Limited and Anglo American Australia Limited. From 1993 to 2003 he was Managing Director of Perpetual Trustees Australia. He is a former partner of McKinsey & Company, management consultants, and a former national managing partner of Blake Dawson Waldron. Mr Bradley was appointed Chairman of Garvan Research Foundation in June 1999 and joined the Garvan Institute Board in November 1999.

Lisa McIntyre
Nominated by the Federal Minister for Health
Dr Lisa McIntyre is a partner with the strategy consulting firm LEK Consulting and head of LEK’s Asia Pacific Life Sciences practice. She has over 15 years consulting for the biotechnology sector and has worked with over 100 different biotechnology and life sciences clients primarily focusing on the challenges associated with commercialising innovation. Dr McIntyre relocated to Sydney in 2002 after nine years in the United States co-heading LEK’s Life Sciences practice where she advised many of the world’s leading biotechnology companies. She is also a Director of Biotech Capital Ltd and AlCor Medical Pty Ltd.
Greg Paramor
Nominated by Garvan Research Foundation
Greg Paramor has been involved in the real estate and property funds management industry for approximately 35 years. Mr Paramor was appointed Managing Director of the Mirvac Group following the acquisition of the James Fielding Group in January 2005. He is the past President of the Property Council of Australia and the Investment Funds Association of Australia. He is currently a Director of a number of companies, including the National Breast Cancer Foundation. He is a Fellow of the Australian Property Institute and a Fellow of The Royal Chartered Institute of Surveyors.

Sister Carol Pedersen RSC
Nominated by the Sisters of Charity
Carol Pedersen graduated as a trained nurse at St Vincent’s Sydney in 1963 and is a Sister of Charity. She holds a PhD from UNSW and a BSW (Hons 1) from the same institution. She also holds an Advanced Diploma from the Sydney College of Homoeopathic Medicine, and recently completed postgraduate work, obtaining an Associate Diploma in Advanced Homoeopathic Medicine. For over 20 years Sr Carol was a member of various Human Research Ethics Committees, and was active at national, state and local levels in the development of Alcohol and Drug Services. Sr Carol lives and works in Sydney’s South West, where she provides pro bono homoeopathic consultations for the poor. In 2008 Sr Carol will take this service to rural areas.

Michael Reid
Until June, 2007
Nominated by the NSW Minister for Health
Professor Michael Reid has had many years of experience in both the public and private sectors. Up to mid 2006, he was Director General of the Ministry for Science and Medical Research in New South Wales. Prior to this appointment he was Director of the Policy and Practice Program at the George Institute for International Health, University of Sydney. For the five years prior to this he held the position as Director General of NSW Health. During 2006/07 he established his consulting company and was engaged in a variety of health and science contracts for both public and private sector clients, in Australia and overseas. He has particular interest in the interface of health, technology and education.

Warren Scott
Nominated by the NSW Minister for Health
Warren Scott is a director of Citigroup and is General Counsel and Managing Director in Australia. He is Chairman, Woolcock Institute of Medical Research, as well as a delegate to the Australian American Leadership Dialogue, the Law Society of New South Wales, the American Bar Association, the New York Bar Association and the California Bar Association. Warren is admitted as a solicitor in New South Wales and as a lawyer in New York and California.

John Shine AO FAA
Appointed by the Garvan Institute Board
Professor John Shine is Executive Director of the Garvan Institute of Medical Research and a board member of the Garvan Research Foundation. He is Professor of Molecular Biology and Professor of Medicine at the University of NSW, and a Director of many scientific, research and medical bodies throughout Australia, including the recent ex-Chairman of the National Health and Medical Research Council (NHMRC), and until 2006 a member of the Prime Minister’s Science, Engineering & Innovation Council (PMSEIC).
Peter J Smith

Nominated by the University of NSW

Professor Smith is Dean, Faculty of Medicine, the University of New South Wales. He specialised in cancer medicine and research following study in Australia, USA and Germany. He has held senior hospital management posts in Brisbane and Melbourne, and senior academic appointments at the Universities of Queensland, Melbourne and Auckland. He has served in a consulting role to Government, including as Chair of the recent Inquiry into Vietnam Veterans Cancer Incidence and Mortality. Professor Smith is currently a Director of St Vincents & Mater Health Sydney, NewSouth Innovations, MedSys Assurance (NZ) and a number of research centres and institutes.

Ronald Trent

Nominated by the Federal Minister for Health

Ronald Trent is Professor of Molecular Genetics, University of Sydney and Head of the Department of Molecular and Clinical Genetics, Royal Prince Alfred Hospital. He is the Executive Director of SUPAMAC, the University’s high throughput DNA analysis service. He has been a member of the NHMRC Research Committee since 1997 and is Chairman of the NHMRC Human Genetics Advisory Committee as well as a member of the NHMRC Council.

Bernadette Tobin

Nominated by the Trustees of St Vincent’s Hospital

Associate Professor Bernadette Tobin is Director of the Plunkett Centre for Ethics at St Vincent’s Hospital, Sydney, and Reader in Philosophy at the Australian Catholic University. Dr Tobin is Honorary Ethicist at the Children’s Hospital at Westmead, Honorary Associate Professor in the Faculty of Medicine at the University of Sydney, and Conjoint Associate Professor in the School of Medicine at the University of New South Wales. She served for three triennia on the Australian Health Ethics Committee, a principal committee of the NHMRC. She also chaired the drafting group which prepared the first Code of Ethics for Catholic Health and Aged Care Services in Australia.
Garvan Research Foundation was established in 1981 to provide the Garvan Institute with an additional source of research funds by attracting financial support from companies and individuals. Over the years, the Foundation has evolved to become Garvan’s marketing and fundraising arm.

The Foundation’s Board is empowered as the governing body to determine the Foundation’s policy and control its affairs subject to the ultimate direction of the Garvan Institute Board.

Graham J Bradley
Nominated by the Sisters of Charity
Graham Bradley is a professional company director. Mr Bradley is Chairman of Stockland Corporation Limited, HSBC Bank Australia Limited and Anglo American Australia Limited. From 1995 to 2003 he was Managing Director of Perpetual Trustees Australia. He is a former partner of McKinsey & Company, management consultants, and a former national managing partner of Blake Dawson Waldron. Mr Bradley was appointed Chairman of Garvan Research Foundation in June 1999 and joined the Garvan Institute Board in November 1999.

Jane Allen
Nominated by the Institute
Jane is the Managing Partner at Egon Zehnder International, Sydney office, the world’s largest privately held search firm with more than 300 consultants located in 62 wholly owned offices in 36 countries. The firm specialises in senior level executive search, board consulting and Director search, management appraisals, and talent management. Jane has been at Egon Zehnder International for eight years where she also leads the Consumer Products Practice Group across Asia Pacific, including India, China, Japan, and South East Asia as well as Australia/New Zealand. Prior to joining Egon Zehnder International Jane worked at Procter & Gamble in both sales and marketing in the US and Australia. Jane has an MBA from Harvard Business School and a Bachelor of Arts from Smith College. Ms Allen joined the Foundation Board in 2007.

Alec Brennan
Nominated by the Trustees of St Vincent’s Hospital
Alec Brennan pursues a portfolio of business and not for profit interests. Until March 2007, he was CEO and Managing Director of CSR Limited. He is Chairman of publicly listed Emeco Limited, Chairman and co-investor in privately owned PPI Limited and Chairman of Tomago Aluminium Pty Ltd. He is a Fellow of the Senate of Sydney University and Chair of several of its committees. Mr Brennan joined the Foundation Board in 2000.

Philip Marcus Clark
Nominated by the Institute
Originally trained in law and management, Mr Clark has led the successful growth and development of two of Australia’s largest law firms, Minter Ellison and Mallesons Stephen Jaques as Managing Partner and CEO. Mr Clark is a member of the JP Morgan Advisory Council, Chairman of the Higher Education Endowment Fund Advisory Board and a Director of ING Management Ltd, CRI Asset Management Limited, M+K Lawyers Holdings Ltd, St James Ethics Centre and two scholarship foundations. He joined the Board in 2005.

Melinda Conrad
Nominated by the Trustees of St Vincent’s Hospital
Melinda Conrad is former Managing Director and founder of the retail store chain, Conrads Warehouse. Prior to her establishment of Conrads, she held management roles at Harvard Business School and Colgate-Palmolive. Ms Conrad is also a Director of the Australian Brandenburg Orchestra. Ms Conrad joined the Foundation Board in September 2003.
Bill Ferris AC

Bill Ferris is Executive Chairman of the CHAMP Private Equity Group, one of Australia’s leading private capital groups, providing venture capital, expansion capital and management buyout funding in Australasia. Mr Ferris is currently Chairman of International Energy Services Pty Ltd and the Garvan Institute of Medical Research. Former directorships include: Chairman, Australian Trade Commission (Austrade) and Austar United Communications Limited, and Director, Bradken Resources Pty Ltd, Tucker Seabrook (Aust) Limited, Australian Pacific Paper Products Pty Ltd.

Mary Foley
Chief Executive Officer, St Vincents & Mater Health Sydney

Mary Foley is Chief Executive Officer, St Vincents & Mater Health Sydney. Previous positions include Deputy Head, NSW Department of Health and Executive Director, NSW Office of Health Policy and senior executive management positions for Mayne Nickless private health care business. Ms Foley is Deputy Chancellor and a member of the Board of Trustees, University of Western Sydney. Ms Foley was NSW Telstra Businesswoman of the Year in 1998 and was awarded the Centenary Medal in 2003 for service to Australian society in business leadership. She is also a Director of the Victor Chang Cardiac Research Institute and the St Vincent’s Research Precinct.

Lyn Gearing
Nominated by the Sisters of Charity

Lyn Gearing was appointed to the Garvan Foundation board in 2005. Ms Gearing is a Director of Stockland Corporation Limited, Hancock Natural Resources Group Australasia Pty Limited and IMB Limited and two other not for profit organisations. Ms Gearing was the CEO of the NSW State Superannuation schemes from 1997 to 2002, and has substantial experience in superannuation, funds management, corporate finance and management consulting.

Meredith Hellicar
Nominated by the Institute

Meredith Hellicar is a company director and consultant in strategy and change. She is Chairman of AMP Life and the Sydney Institute and a Director of AMP Limited, AMP Bank and Amalgamated Holdings. Meredith is a member of the Takeovers Panel and was awarded a Centenary Medal for Business Leadership. Her former directorships include Chairman of James Hardie Industries and of HLA Envirosiences, Director of Southern Cross Airports Group, NSW Treasury Corporation, AurionGold and the NSW Environment Protection Authority. Previous executive roles include Managing Director of InTech Financial Services, Chief Executive Officer of Corrs Chambers Westgarth and Managing Director of TNT Logistics Asia. Ms Hellicar joined the Foundation Board in March 2002.

Byram Johnston OAM
Nominated by the Sisters of Charity

Byram Johnston OAM is the Chief Executive Officer of MainstreamBPO, a company providing back office processing and administration services to fund managers and superannuation funds. Prior to establishing this business he spent over 30 years as a management consultant. He serves on the board of a number of companies. He joined the Foundation Board in 1997.

Meredith Hellicar
Nominated by the Institute

Meredith Hellicar is a company director and consultant in strategy and change. She is Chairman of AMP Life and the Sydney Institute and a Director of AMP Limited, AMP Bank and Amalgamated Holdings. Meredith is a member of the Takeovers Panel and was awarded a Centenary Medal for Business Leadership. Her former directorships include Chairman of James Hardie Industries and of HLA Envirosiences, Director of Southern Cross Airports Group, NSW Treasury Corporation, AurionGold and the NSW Environment Protection Authority. Previous executive roles include Managing Director of InTech Financial Services, Chief Executive Officer of Corrs Chambers Westgarth and Managing Director of TNT Logistics Asia. Ms Hellicar joined the Foundation Board in March 2002.

Ross King
Nominated by the Institute

Ross King is a Managing Director at Goldman Sachs JBWere where he has spent the last 16 years providing investment banking and financing advice. He has worked across numerous product areas including investment banking, equity sales and research and was made a Partner in 1994. He fulfilled senior roles in both the New York and London offices before returning to Sydney in 2001 as Co-Head of the Healthcare, Consumer & Industrial divisions of the Investment Banking department. Ross now has responsibility for the Natural Resources division. Mr King joined the Foundation Board in 2005.
GOVERNANCE

Garvan Research Foundation Board

John Koch

Nominated by the Trustees of St Vincent’s Hospital
John Koch is Chief Representative of the Hong Kong based Forma Group of Companies, a former board member of St Vincent’s Hospital and Chair of its Finance Committee. He is Chair, Woods Cottage Foundation which assists intellectually disabled young adults. He had a 32 year career with the Commonwealth Bank assuming a range of domestic and international responsibilities. Mr Koch joined the Foundation Board in 2000.

John Landerer AM

Nominated by the Institute
Mr Landerer is a solicitor specialising in corporate advisory work and is also a professional company director. He has served as Chairman of the Home Purchase Assistance Authority and is on the Board of Life Education Australia and the Royal Institute for Deaf and Blind Children as well as on the Boards of various charitable institutions. Mr Landerer was appointed a Visiting Professor at Macquarie University in Business and Commercial Law and holds an honorary doctorate from that University. He is also a Fellow of Sydney University. Mr Landerer is a Member of the Order of Australia and a Commander of the Most Excellent Order of the British Empire. He joined the Board in 2007.

Sister Paulina Pilkington RSC AM

Nominated by the Sisters of Charity
Sister Paulina has a broad background in health policy formation, having been a member of the Hospitals and Health Services Commission (Sax Commission) and Assistant Director General, Nursing Branch, Federal Department of Health. Sister Paulina resigned from the Garvan Institute Board in February 2000 and has been a member of the Foundation Board since 1994.

Russell Scrimshaw

Until February, 2007
Nominated by the Institute
Russell Scrimshaw is a board member of Fortescue Metals Group Limited. He was, until late 2002, the Group Executive of the Commonwealth Bank’s Technology, Operations and Procurement Business Unit. He has also previously held executive marketing, business operations and senior management positions with Optus Communications, Amdahl and IBM. In his role at the Commonwealth Bank, Mr Scrimshaw also held the positions of Chairman, Cyberlynx and Director of the Boards of EDS Australia and Telecom New Zealand Australia. Mr Scrimshaw joined the Foundation Board in 2000.

John Shine AO FAA

Professor John Shine is Executive Director of the Garvan Institute of Medical Research and a board member of the Garvan Research Foundation. He is Professor of Molecular Biology and Professor of Medicine at the University of NSW, and a Director of many scientific, research and medical bodies throughout Australia, including the recent ex-Chairman of the National Health and Medical Research Council (NHMRC) and until 2006 a member of the Prime Minister’s Science, Engineering & Innovation Council (PMSEIC).

Timothy J Sims

Until February, 2007
Nominated by the Trustees of St Vincent’s Hospital
Tim Sims is Managing Director at Pacific Equity Partners. He is a Director of a number of portfolio companies. He was previously Chairman and Managing Partner at Bain International and before that Managing Partner of LEK Partnership Asia Pacific and a founder of the firm. He is a Director and founder of the Australian Charities Fund and a Member of the Board of the Ravenswood School for Girls. Mr Sims joined the Foundation Board in 1994.
GOVERNANCE
Garvan Research Foundation Board

Ian Smith
Nominated by the Sisters of Charity
Ian Smith was until recently Chief Executive of Yahoo7. He has more than 20 years experience as a company director and advisor in the advertising, marketing communications and media industries. Prior to leading the management buyout of the Communications Group in 2003, Mr Smith spent five years in New York as President International of Bates Worldwide and Director of the publicly listed Cordiant Communications PLC. He also led the development of Cordiant’s global e-business consultancy, which now operates in most major markets around the world. Mr Smith has served on a number of government and philanthropic advisory groups including the Whitney Museum in New York and the State Library of New South Wales.

The Hon Warwick L Smith AM
Nominated by the Trustees of St Vincent’s Hospital
Warwick Smith is Chairman of the Advisory Board of Australian Capital Equity where he has a strategic focus on international and domestic cross-sector activities. He is Chairman of NSW for the ANZ Bank, and of E-TRADE. Formerly, Warwick was an Executive Director with Macquarie Bank operating as Global Head of the Corporate Communications Division and chaired the Telecommunications, Media, Entertainment and Technology Group within Investment Banking. In a 15 year Parliamentary career he served as a Federal Government Minister and in a variety of public roles. He was Australia’s first Telecommunications Ombudsman. Warwick has a strong focus on international affairs. He is the Immediate past Chair of the Australia China Business Council, the Deputy Chair of the Asia Society of Australia and a board member of the Global Foundation. He joined the Board in 2007.

Nick Tait OBE FAICD
Until February, 2007
Nominated by the Institute
Nick Tait is a Director of Green Globe Asia Pacific and an amateur grazier. He is a former Director of Qantas Airways, British Airways Holdings (Australia) and Concorde International Travel and was previously General Manager Investments and Joint Ventures for British Airways. Mr Tait joined the Foundation Board in 2000.

Peter Wade
Nominated by the Institute
Mr Wade is currently a consultant to a major financial services organisation and a company director. Peter previously spent over 25 years providing investment banking and financial advice with JBWere and its current form, Goldman Sachs JBWere, more recently he was with JPMorgan. He worked for nearly 15 years in Europe and the United States before returning to Australia. He is a Director of MMC Contrarian Limited, an ASX listed company.

Richard FE (Dick) Warburton AO
Nominated by the Trustees of St Vincent’s Hospital
Dick Warburton is currently Chairman of the Board of Taxation, Magellan Flagship Fund, and Tandou Limited. He is a Director of Note Printing Australia, Citibank and Caltex Australia. He holds various other positions on committees and advisory boards within Australia. Mr Warburton is a former Chairman and CEO of DuPont Australia and New Zealand, whom he has worked with for 30 years. Mr Warburton joined the Foundation Board in 1999.

Marvin Weinman
Until September, 2007
Nominated by the Sisters of Charity
Marvin Weinman is a company director and business adviser. He is a Director of Co Sport Pty Ltd and Proplanet Pty Ltd. His previous executive positions include Managing Director, George Weston Foods and Boral Building Products, and senior management roles at BTR Nylex Ltd and ACI Ltd. In addition to Garvan, his community interests include Chairman of Outcomes Australia and Share Life Australia. He is also a member of the Corporate Committee of the Intensive Care Foundation of Australia. Mr Weinman joined the Foundation Board in 2003.


Campbell LV. How many cases of Type 2 diabetes mellitus are due to being overweight in middle age? Evidence from the Midspan prospective cohort studies using mention of diabetes mellitus on hospital discharge or death records. *Diabet Med* 2007; 24:author reply 1172-3.


Heilbronn LK, Gam SK, Turner N, Campbell LV, Chisholm DJ. Markers of mitochondrial biogenesis and metabolism are lower in overweight and obese insulin-resistant subjects. *J Clin Endocrinol Metab* 2007; 92:1467-73.


Kincaid MM, Cooper AA. ERADicate ER Stress or Die Trying. *Antioxid Redox Signal* 2007; 9:2373-87.


Suryani S, Sutton I. An interferon-gamma-producing Th1 subset is the major source of IL-17 in experimental autoimmune encephalitis. *J Neuroimmunol* 2007; 183:96-103.


## FINANCIAL HIGHLIGHTS
Garvan Institute of Medical Research

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<td>NHMRC Grants</td>
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<td>9,244</td>
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<td>Other Peer Reviewed Grants</td>
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<td>6,222</td>
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<td>NSW Government Grant</td>
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<td>Other Income</td>
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<td><strong>Total Operating Income</strong></td>
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<td>Research Expenditures</td>
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<td><strong>Total Operating Expenses</strong></td>
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<td><strong>24,099</strong></td>
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<td><strong>34,276</strong></td>
<td><strong>37,743</strong></td>
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<tr>
<td>Building Asset Amortisation</td>
<td>(1,171)</td>
<td>(1,171)</td>
<td>(1,171)</td>
<td>(1,171)</td>
<td>(1,180)</td>
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<tr>
<td>Property, Plant and Equipment Depreciation</td>
<td>(419)</td>
<td>(1,235)</td>
<td>(2,178)</td>
<td>(2,449)</td>
<td>(2,433)</td>
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<tr>
<td>Transfer from/(to) Building Reserve</td>
<td>1,047</td>
<td>1,047</td>
<td>1,047</td>
<td>(1,353)</td>
<td>1,047</td>
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<tr>
<td>Endowment Grants</td>
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<td>1,250</td>
<td>745</td>
<td>10,965</td>
<td>2,210</td>
</tr>
<tr>
<td>Endowment Earnings</td>
<td>394</td>
<td>463</td>
<td>1,011</td>
<td>2,181</td>
<td>2,589</td>
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<tr>
<td><strong>Net Income</strong></td>
<td><strong>6,306</strong></td>
<td><strong>601</strong></td>
<td><strong>2,222</strong></td>
<td><strong>23,011</strong></td>
<td><strong>6,100</strong></td>
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<tr>
<td>Accumulated Surplus/(Deficit) Brought Forward</td>
<td>(3,208)</td>
<td>1,486</td>
<td>922</td>
<td>308</td>
<td>9,851</td>
</tr>
<tr>
<td>Transfer from/(to) Research Program Reserve</td>
<td>510</td>
<td>(583)</td>
<td>(1,110)</td>
<td>(107)</td>
<td>(2,526)</td>
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<tr>
<td>Transfer to Endowment Reserve</td>
<td>(2,122)</td>
<td>(582)</td>
<td>(1,726)</td>
<td>(11,809)</td>
<td>(3,664)</td>
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<tr>
<td>Transfer from/(to) Infrastructure Expense Reserve</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>(1,552)</td>
<td>1,035</td>
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<td><strong>Accumulated Surplus Carried Forward</strong></td>
<td><strong>1,486</strong></td>
<td><strong>922</strong></td>
<td><strong>308</strong></td>
<td><strong>9,851</strong></td>
<td><strong>10,796</strong></td>
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</tbody>
</table>

The figures in 2003, 2004, 2005 and 2006 have been adjusted to reflect the adoption of AASB116 Property, Plant and Equipment.
### Balance Sheet

<table>
<thead>
<tr>
<th></th>
<th>2003</th>
<th>2004</th>
<th>2005</th>
<th>2006</th>
<th>2007</th>
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<td><strong>Current Assets</strong></td>
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<tr>
<td>Property, Plant and Equipment</td>
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<td>3,672</td>
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<td>55,115</td>
<td>57,284</td>
<td>79,675</td>
<td>91,856</td>
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<td><strong>Current Liabilities</strong></td>
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<tr>
<td>Current Liabilities</td>
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<td>2,949</td>
<td>3,547</td>
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<td>9,952</td>
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<td>Borrowings</td>
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<td>6,000</td>
<td>6,000</td>
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<td><strong>Total Liabilities</strong></td>
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<td>11,010</td>
<td>12,004</td>
<td>10,032</td>
<td>17,160</td>
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<tr>
<td><strong>Accumulated Surplus</strong></td>
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<tr>
<td>Accumulated Surplus</td>
<td>1,486</td>
<td>922</td>
<td>308</td>
<td>9,851</td>
<td>10,796</td>
</tr>
<tr>
<td>Reserves</td>
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<td>43,183</td>
<td>44,972</td>
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<td>63,900</td>
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<td>44,105</td>
<td>45,280</td>
<td>69,643</td>
<td>74,696</td>
</tr>
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</table>

The figures in 2003, 2004, 2005 and 2006 have been adjusted to reflect the adoption of AASB116 Property, Plant and Equipment.
## FINANCIAL HIGHLIGHTS

### Garvan Research Foundation

<table>
<thead>
<tr>
<th>Statement of Funds</th>
<th>2003</th>
<th>2004</th>
<th>2005</th>
<th>2006</th>
<th>2007</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$'000</td>
<td>$'000</td>
<td>$'000</td>
<td>$'000</td>
<td>$'000</td>
</tr>
<tr>
<td>Donations &amp; Pledges</td>
<td>3,313</td>
<td>3,276</td>
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<td>Public Awareness Program</td>
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<td>56</td>
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<td><strong>Net Funds Raised</strong></td>
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<td>2,862</td>
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<td>Accumulated Funds Prior Years</td>
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<tr>
<td><strong>Funds Available for Grants to Institute:</strong></td>
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<td>1,104</td>
<td>1,493</td>
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<tr>
<td>Endowment Funds</td>
<td>2,003</td>
<td>1,250</td>
<td>745</td>
<td>10,965</td>
<td>2,210</td>
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<tr>
<td><strong>Total Grants</strong></td>
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<td>Accumulated Funds Carried Forward</td>
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<td>Represented By:</td>
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<tr>
<td>Assets</td>
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<td>Less: Liabilities</td>
<td>70</td>
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<td>202</td>
</tr>
<tr>
<td><strong>Net Assets</strong></td>
<td>189</td>
<td>130</td>
<td>129</td>
<td>78</td>
<td>109</td>
</tr>
</tbody>
</table>
Give me a lever long enough and a fulcrum on which to place it, and I shall move the world.
ARCHIMEDES

The important truths are that knowledge is power, knowledge is safety, knowledge is happiness.
THOMAS JEFFERSON

IMAGINATION, BASED ON KNOWLEDGE, IS THE KEY TO DISCOVERY

The most beautiful thing we can experience is the mysterious. It is the source of all true art and all science.
ALBERT EINSTEIN

There’s real poetry in the real world. Science is the poetry of reality.
RICHARD DAWKINS

If an elderly but distinguished scientist says that something is possible, he is almost certainly right; but if he says that it is impossible, he is very probably wrong.
ARTHUR C. CLARKE

Nothing in life is to be feared. It is only to be understood.
MARIE CURIE

Men love to wonder, and that is the seed of science.
RALPH WALDO EMERSON

The most exciting phrase to hear in science, the one that heralds new discoveries, is not ‘Eureka!’ but ‘That’s funny...’
ISAAC ASIMOV
Garvan’s mission is to make significant contributions to medical science that will change the directions of science and medicine and have major impacts on human health. Garvan strives to enhance and develop research programs that combine fundamental science with strong clinical interactions.