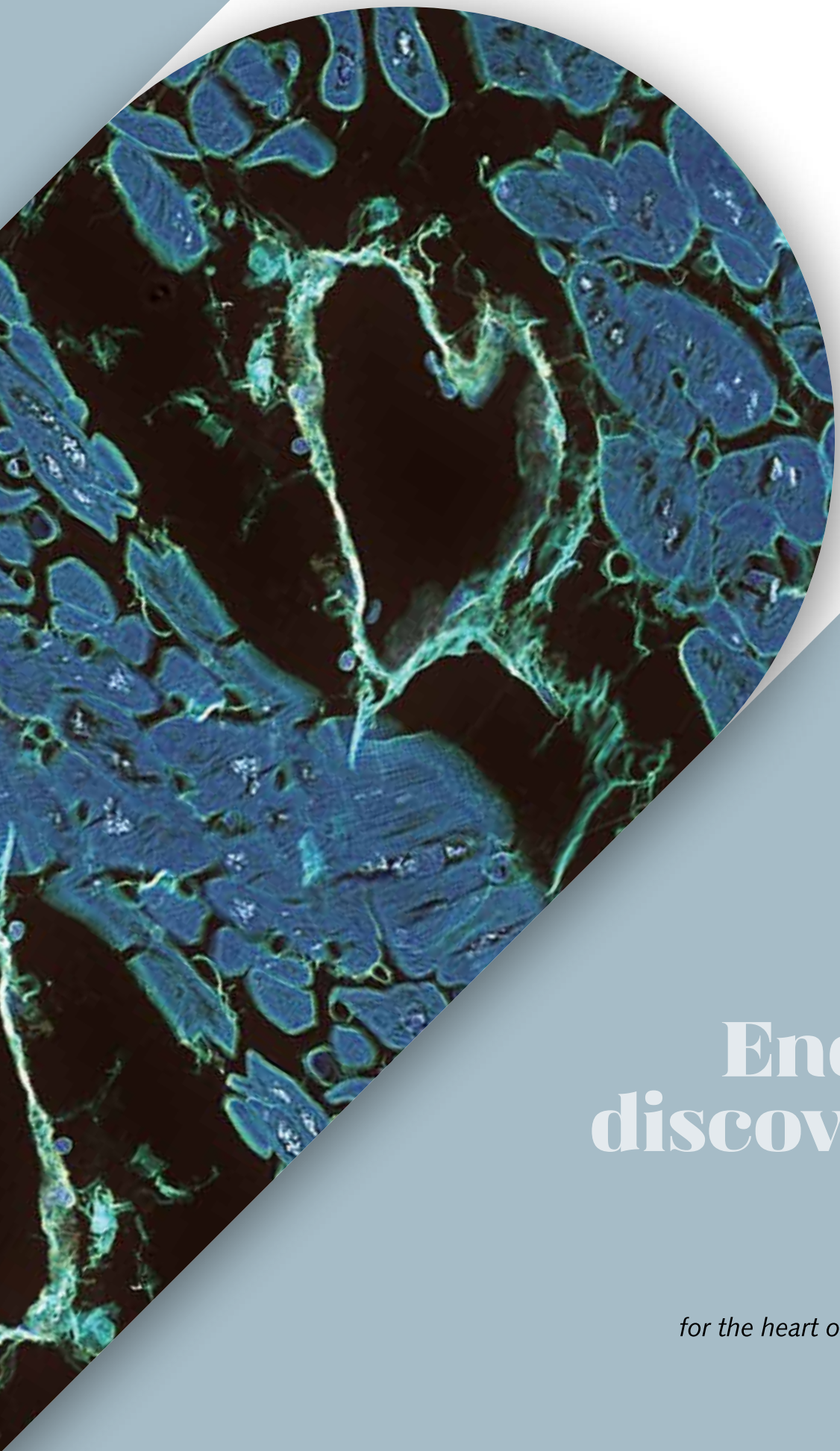
Annual Report 2012

Victor Chang
Cardiac Research Institute



Enduring discoveries

for the heart of Australia...

Cover image: "*Capillary Cordis*"

"Under the strain of a scarred and blocked heart valve, the muscle cells of this middle-aged lady's heart weren't coping. During open heart surgery to replace the valve, a small biopsy of muscle tissue was taken, which was later analysed under a light microscope at 400x magnification. The sample was stained with Picrosirius Red and during analysis this isolated heart-shaped blood vessel caught my eye. It sits in the midst of atrophied and scarred myocardium."

Image by Dr Andrew Jabbour, Cardiac Physiology and Transplantation Division.
Winner, Inaugural Victor Chang 'Art of the Heart' competition 2012.

Discovery begins with individuals.

Some institutes recognise great individuals and create extraordinary teams.

Our teams are making discoveries that will shape the future of human health.

Building on Victor Chang's vision, our discoveries reach beyond the laboratory to directly benefit people everywhere.

In 2012, we celebrate these discoveries.

Victor Chang Cardiac Research Institute
2012 Annual Report

MISSION

“The relief of pain and suffering and the promotion of well-being, through an understanding of the fundamental mechanisms of cardiovascular biology in health and disease.”

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Trustee's Foreword

It is now three years since the Trustees of Mary Aikenhead Ministries took up their responsibilities for the governance of the Education, Health, Research and Welfare Ministries which were the result of 174 years of service to the Church and the Australian community by the Sisters of Charity of Australia.

The Trustees are privileged to meet many committed people as they visit the many facilities and works passed to our care by the Sisters of Charity of Australia. As we lament the reducing number of Sisters, we rejoice in the faith and passion of those who continue their work based on the commitment of service to the poor and marginalised. The Sisters recognised the importance of research as fundamental to better health outcomes and this is foundational to the Research Institutes within the Ministries.

The additional legacy of the skills and passionate care of Dr Victor Chang is also continued by the Institute by the research undertaken and translated, currently and in the future, to better health outcomes for the general community.

The Trustees of Mary Aikenhead Ministries would like to congratulate both Steven Lowy and Bob Graham, the Board and all staff on the continued success and contribution of the Victor Chang Cardiac Research Institute to the health and research communities. The Trustees are also very grateful to the people of great commitment and ability who continue to contribute so much to ensure that the Institute continues to excel.

On behalf of the Trustees of Mary Aikenhead Ministries, I am pleased to commend to you the 2012 Annual Report of Victor Chang Cardiac Research Institute.

David Robertson
Chairman,
Trustees of Mary Aikenhead Ministries

MARY AIKENHEAD MINISTRIES

Mary Aikenhead Ministries was established by the Holy See as a Public Juridical Person at the request of the Congregation of the Religious Sisters of Charity of Australia to succeed to, and to carry on and expand, various health and aged care, education and welfare ministries conducted by the Sisters of Charity.

The Victor Chang Cardiac Research Institute Limited is a Research Ministry within Mary Aikenhead Ministries, which operates in accordance with the Canonical Statutes approved by the Holy See. Mary Aikenhead Ministries also assumes an Australian civil identity under Australian law as the Trustees of Mary Aikenhead Ministries. The Trustees operate pursuant to the Constitution of Trustees of Mary Aikenhead Ministries. In 2012, the Trustees are Mr David Robertson, Sr Helen Clarke, Professor Gabrielle McMullen, Ms Rowena McNally, Dr Tessa Ho and Mr Jim Russell.

Mary Aikenhead Ministries
Chair, Mr David Robertson

Affiliations
University of NSW
St Vincent's Health Australia

Victor Chang
Cardiac Research Institute

Board of Directors
Chairman, Mr Steven Lowy AM

Board Committees

Finance
Chair, Mr John Kean OAM
(Until April 2012)
Chair, Mr David Craig
(From May 2012)

Appeals
Chair, Mrs Louise Di Francesco

Media and Communications
Chair, Ms Jill Margo AM

Executive Director
Professor Robert Graham AO

Deputy Directors
Professor Richard Harvey
Professor Jamie Vandenberg

Scientific Advisory Committee

Chief Operating Officer
Ms Dianne Kitcher

Fund Development
Ms Jan Savage

Administration
Finance
Human Resources
Information Technology
Policy
Media and Communications

Essential Services

Core Facilities

Molecular Cardiology and Biophysics
Division Head,
Professor Robert Graham AO

Developmental and Stem Cell Biology
Division Head,
Professor Richard Harvey

Cardiac Physiology and Transplantation
Division Head,
Professor Michael Feneley AM

Structural and Computational Biology
Acting Division Head,
Dr Daniela Stock

Molecular Genetics
Acting Division Head,
A/Professor Catherine Suter

About Us

WHO WE ARE

Founded in 1994, originally under the auspices of the Sisters of Charity and St Vincent's Hospital, the Victor Chang Cardiac Research Institute became an independent research facility in 1995. It is committed to excellence in research, training and the rapid translation of discoveries into new diagnositic, preventative and therapeutic regimens for people with or at risk of heart disease. The Institute is dedicated to the memory of cardiac surgeon Victor Chang and his passionate belief in the power of discovery.

Our team of over 150 full-time staff work across five Research Divisions – Cardiac Physiology and Transplantation, Developmental and Stem Cell Biology, Molecular Cardiology and Biophysics, Molecular Genetics and Structural and Computational Biology.

OUR INSPIRATION

A pioneering surgeon, researcher and humanitarian, Dr Victor Chang AC founded the National Heart Transplant Program at St Vincent's Hospital in 1984, and in 1990 spearheaded the Heart of St Vincent's Appeal.

This Appeal raised much-needed funds for a Cardiac Transplant Ward and Cardiac Diagnostic Unit at St Vincent's – and created the impetus for establishing the Victor Chang Cardiac Research Institute after his untimely death in 1991.

ESTABLISHMENT

The new Institute was opened on 14th February 1994, thanks to generous donations from the late Mr Kerry Packer, AC, the Federal Government, and the Australian public. The Institute was incorporated as an independent research facility on 27th February 1995. In 1996, the Institute's temporary premises in the Garvan Building were opened by the late Diana, Princess of Wales.

INDEPENDENCE

Through contributions from the NSW and Australian Federal Governments, the Lowy and Packer families, the Atlantic Philanthropies, the National Australia Bank, ANZ Bank, Citigroup and many others, the $80 million Lowy Packer Building was constructed and formally opened by Her Royal Highness Crown Princess Mary of Denmark in September, 2008.

WORKING FOR A BETTER FUTURE

In Australia, more than 45,000 people die of cardiovascular disease each year. It kills one Australian every 12 minutes. Heart failure also remains the most common cause of hospital admissions for people aged over 65, although it can affect anyone regardless of age or gender. Through heart surgery, Dr Victor Chang was able to save hundreds of lives, but he knew that research could save thousands.

In his memory, the five research divisions and 14 laboratories of the Institute work with a single vision – to reduce the incidence, severity and impact of heart diseases, particularly those causing heart muscle diseases, which directly affect the heart's ability to pump sufficient blood for the body's needs and can result in the most severe forms of heart failure.

These research programs address vital contemporary issues – including heart development and congenital heart disease, inherited heart diseases, the potential application of adult stem cell technologies in cardiovascular care, cardiac arrhythmias, and how heart function is regulated in response to stresses like high blood pressure and ageing.

“In Australia, more than 45,000 people die of cardiovascular disease each year – one every 12 minutes.”

Our Inspiration: Dr Victor Chang

VICTOR CHANG, AC (1936 – 1991)

A highly accomplished surgeon, humanitarian and skilled campaigner, Dr Victor Chang was a pioneer in the modern era of heart transplantation.

His achievements include the development of Australia's National Heart Transplant Program at St Vincent's Hospital, which has performed more than 1500 successful heart, heart-lung, and single lung transplants since 1984.

He also saw the incredible value of research – playing a key role in the development of an artificial heart valve and, in later years, an artificial heart assist device.

Victor Chang (Yam Him) was born in Shanghai to Australian-born Chinese parents in 1936. He came to Australia in 1953 as a student at the Christian Brothers College, Lewisham. In 1962 he graduated from Sydney University with a Bachelor of Medicine, Bachelor of Surgery, becoming an intern and, later, a registrar in cardiothoracic surgery at St Vincent's Hospital.

Travelling overseas to extend his skills, Dr Chang attained a Fellowship in Surgery from the English and American College of Surgeons and returned to St Vincent's Hospital in 1972, where he worked with the renowned Dr Harry Windsor and Dr Mark Shanahan, who had performed Australia's first heart transplant at St Vincent's Hospital in 1968.

During the 1980's Dr Chang lectured extensively in China, Hong Kong, Indonesia, Singapore and Malaysia. He also founded the Australasian-China Medical Education and Scientific Research Foundation, which sponsored South-East Asian doctors, nurses and students to work in Australia to develop improved skills and quality-of-care to take back to their home countries.

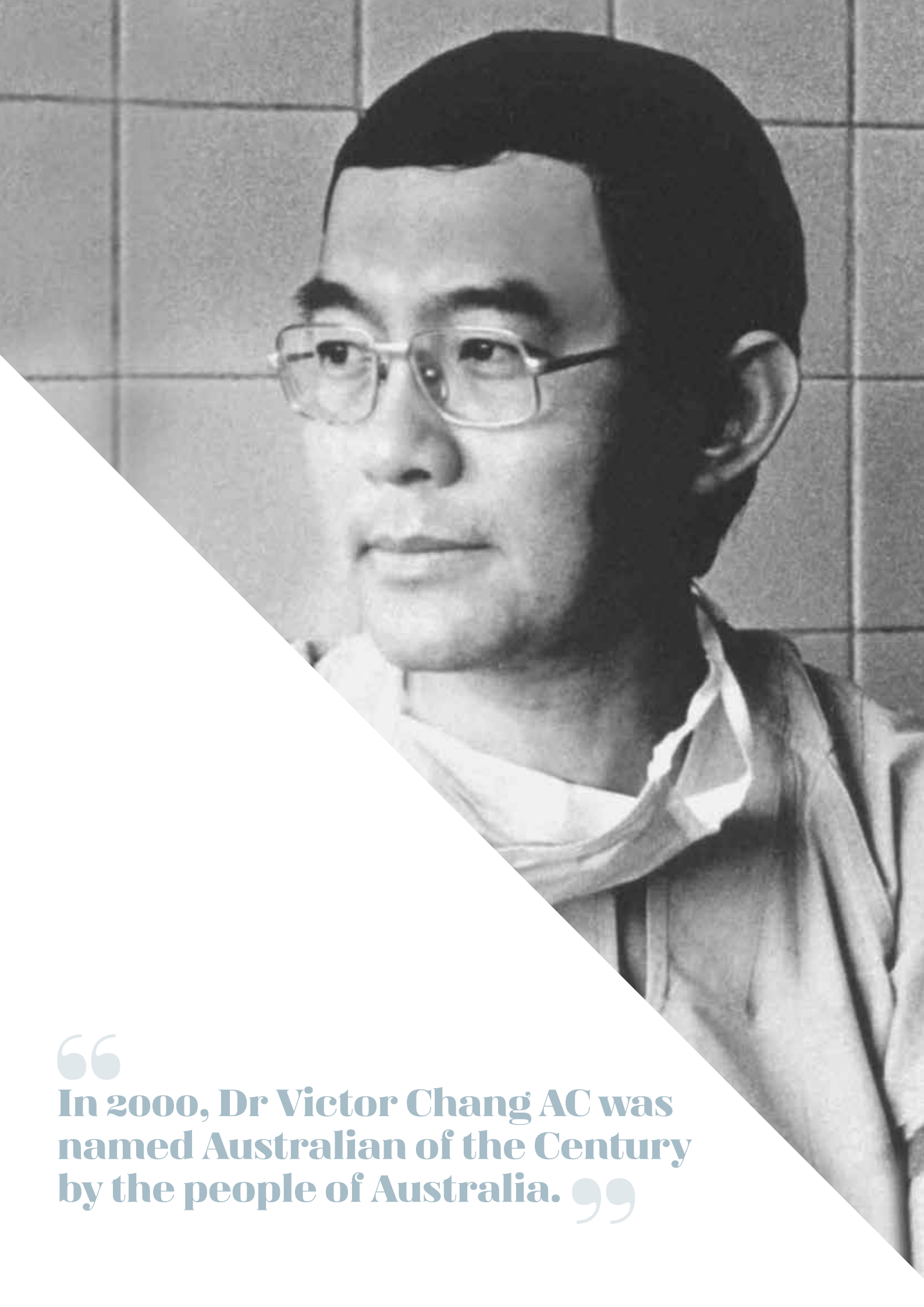
At the same time, he helped teams from St Vincent's travel to China, Singapore and Indonesia where they shared their medical, surgical, nursing, hospital administration and audiovisual expertise.

In 1986 Dr Chang was awarded Australia's highest recognition, a Companion of the Order of Australia (AC), while the University of New South Wales awarded him its highest degree of MD (Honoris Causa) for "scholarly achievement and humanitarian endeavour".

Victor Chang died in tragic circumstances in Sydney on 4 July 1991.

He was an honorary Professor of Surgery to the Chinese Academy of Medical Science in Peking; an honorary Professor of Surgery to Shanghai Medical School; official adviser on cardiac surgery development in Indonesia; and a member of the Australia China Council.

In 2000, Dr Victor Chang was named Australian of the Century by the people of Australia.



In 2000, Dr Victor Chang AC was named Australian of the Century by the people of Australia.

Chairman's Report

I am pleased to report on yet another successful year for the Victor Chang Cardiac Research Institute. First and foremost, we measure our success by the quality of the research undertaken by our dedicated team of scientists and research staff. But we also judge performance by our ability to raise awareness about cardiac disease, our fundraising and our management of what continues to be challenging financial circumstances. On all fronts, 2012 was another successful year.

In 2012 the Institute published an impressive 71 papers, including 13 reviews and editorials and two book chapters, with major papers in many of the world's leading journals, including *Cell*, the *Journal of the American College of Cardiology, Developmental Cell* and *Blood*. In 2012, just four Australian papers were published in Cell – one of the most prestigious of these international journals. The Institute was responsible for two of these – Dave Humphreys' work published in May, contributing to the discovery of a large number of previously unknown yet important 'RNA' proteins, which may help shed light on their role in disease and metabolism, and the landmark discovery by Sally Dunwoodie's laboratory, published in April, that could help women reduce or even eliminate the risk of having babies born with congenital heart defects.

The significance of these findings is not to be underestimated. Dunwoodie's study provides a new paradigm for the interaction between our genes and the environment. For many years, scientists around the world had long suspected that both 'nature' and 'nurture' were molecularly responsible for causing birth defects, but had yet to prove this consequentially. Their research will help to genetically diagnose a whole range of birth defects, as well as giving advice to women on how and when to avoid certain activities when pregnant. Down the track, this could lead to the development of therapeutics to stop these defects occurring in the first place.

Prudent management of our budget and success in grant outcomes and fundraising has maintained the Institute's sound financial position.

For 2012, the Institute budgeted for a deficit of $634,000 but I am pleased to report a strong result with a surplus of $1.2 million, being $1.8 million better than budgeted. Total revenue for 2012 increased from $17.5 million to $19 million while operational costs increased from $18 million to $18.7 million. In 2011, the unrealised loss on revaluation of financial assets was $826,000 which was turned around in 2012 to an unrealised gain of $983,000 due to the better performance of the financial markets, and prudent management by the Finance Committee.

Grant income increased by $1 million from $12.5 million to $13.5 million in 2012. The Institute had another very solid year in terms of success with peer-reviewed grant applications, receiving in total over $9.5 million in new grant and fellowship funding, which, along with essential donations from the public, are used to directly fund our research work.

This included $7.2 million from the National Health and Medical Research Council (NHMRC) over 3-5 years, $900,000 from the Australian Research Council (ARC), and $1.5 million from National Heart Foundation and other foundations and trusts.

Fundraising activities generated $4.2 million in revenue during the year, including $1.6 million from bequests. Fundraising continues to be an essential element in reducing the gap between grant income and operating costs and plays an important role in extending our network of supporters and raising our profile in the wider community. 2012 saw some great fund raising initiatives.

The first was the Chain Reaction corporate cycling event which raised $740,000 for the Institute. The event involved five teams of six corporate executives riding 1100 kilometres over a week to raise funds via corporate and personal donations. The major team sponsors were Ernst & Young, Gadens Lawyers, National Australia Bank, Colonial First State Global Asset Management and Westfield Group.

In 2012 the focus of the fundraising effort was to support the work of Professor Sally Dunwoodie's team in the area of congenital heart disease. I am pleased that Chain Reaction has agreed to support the Institute again in 2013 and we look forward to working closely with the organisation to help fundraise and raise awareness about the importance of our research programs.

“On all fronts, 2012 was another successful year.”

Another cycling charity event that has supported the Institute for many years is Paceline, established by Steve Quinn to raise awareness and funds for cardiac arrhythmia research. Steve, who is an atrial fibrillation patient, and his peloton of 35 riders travelled from Coolangatta to Sydney and raised a significant amount of media interest and funds for the Institute's 2012 research program.

As always, the Institute conducted several events during the year to raise awareness about our work. In 2012 the highlights included the inaugural Monica O'Loughlin Women Against Heart Disease Lunch. This lunch is just one of several initiatives undertaken by the Institute to promote the fact that heart disease continues to kill four times more women in Australia than breast cancer.

Another example of this focus on women's health is the Priceline Sisterhood which consolidated its relationship with the Victor Chang Institute during 2012 to assist women affected by serious illness.

Early in 2012 one of the Institute's directors, Mr Ryan Stokes, and long-standing supporter of the Institute, Mr James Packer, arranged a business lunch in Perth to raise funds and awareness of the Institute's work. This was an important step towards our longer-term goal of developing our profile in Perth and extending our network of friends and supporters. We were also grateful to be nominated as a recipient of funding from Telethon 7 Perth which raised nearly $17 million for a range of charitable causes in 2012.

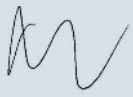
The Victor Chang Annual Ball continues to be our signature event each year and in 2012 was attended by more than 600 guests. Club Marconi also held their inaugural 'Heart of the West' Ball in 2012, raising in excess of $80,000 for the Institute, which was a fantastic effort.

These events, and other initiatives such as our School Science Awards, the Victor Chang Media Awards and the Health Check Booth supported generously by HCF and IMB, underpin our efforts to support our core business which is research into the causes and prevention of cardiac diseases. They all require a tremendous amount of hard work and dedication by Institute staff and our highly-valued friends and supporters who routinely give of their time and expertise. Several of these supporters were acknowledged by becoming Life Governors and Ambassadors in 2012 – on behalf of the board of the Institute I extend our thanks to them all.

I have been fortunate to serve the Institute with the support and advice of the many people who contribute to its ongoing success. I would like to acknowledge my fellow board members, including Mr David Craig, who now chairs the board's Finance Committee; Mrs Louise Di Francesco who chairs the Appeals Committee and Ms Jill Margo who chairs the Media and Communications Committee. I would also like to thank the Trustees of the Mary Aikenhead Ministers, board member Sr Anthea Groves, Appeals Committee member, Sr Clare Nolan, as well as all of the Sisters of Charity.

I would also like to acknowledge the outstanding leadership of Professor Bob Graham who, as Executive Director of the Institute, continues to inspire and guide our talented team of research staff.

I look forward to the year ahead and to building on what has already been achieved as we continue to honour the work and the legacy of Victor Chang.



Steven Lowy AM
Chairman

Executive Director's Report

The Victor Chang Cardiac Research Institute is devoted to saving lives from cardiovascular disease. If there ever was a moment for action in the fight against heart disease, that time is now. Although we know more than ever before about how the heart and our vascular system functions, cardiovascular disease remains Australia's number one killer.

The death of our dear friend and colleague from a heart attack in 2009, inspired the Institute to launch the first *Monica O'Loughlin Women Against Heart Disease Lunch* in 2012 in her honour, and to embark on a campaign to increase women's knowledge of their risk factors. Monica's untimely death reminded me why I became a scientist: to have the satisfaction of answering important questions that will ultimately save people from heart disease.

Although scientific research is usually regarded as a marathon, not a sprint, this year has been marked by some world-first discoveries that have directly helped families live free from the burden of disease. We have been leading the way to transform cardiovascular disease from deadly to preventable.

Firstly, Diane Fatkin and Jamie Vandenberg found a way to reverse a heart condition in a family who have abnormal heart beats. Associate Professor Fatkin realised that this family carried a rare gene mutation, and that they could benefit from a type of medication not normally used in this type of disease. After only six months of treatment, the heart beats of all those affected returned to normal and, importantly, their heart function normalised.

Next, Catherine Suter and her laboratory showed that the mother's diet that a baby is exposed to in the womb can change how our genes work. Importantly, they showed that this change can even be inherited by future generations – through a mechanism known as epigenetics. Adam Hill and his team were invited to present at a conference in the USA regarding a computer program they developed, initially to map how hearts beat, but with all sorts of applications.

Another standout faculty member this year was Sally Dunwoodie – who, together with her colleague, Duncan Sparrow and others, published a very major paper in the world's leading journal, *Cell*. Their research could prevent babies from being born with congenital defects. Sally also received almost $1 million in new grant funding, was appointed to the editorial board of the world's leading physiology journal, *Physiological Reviews*, and was named amongst the Top 100 "Thinkers" in the *Sydney Magazine* for her significant research achievements.

We also welcomed a new faculty member, Professor Roland Stocker, to our team. Roland is an internationally renowned vascular biologist, who studies how our arteries develop the fatty plaques known as atherosclerosis.

You can read more about these ground-breaking discoveries and accomplishments further on in this report.

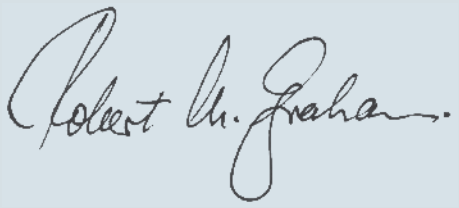
I am proud of what the Institute has accomplished in this challenging economic climate, and am pleased that I could appear before the Federal Government's McKeon review that examined the state of health and medical research in Australia. We *all* need to continually remind our political leaders how important medical research funding is for our community.

I would like to take the time to commemorate another of Australia's great cardiac pioneers, Emeritus Professor Paul Korner AO, who sadly passed away in October. Professor Korner was a world authority on hypertension and blood pressure. He was a mentor of mine whilst I studied under him at the University of New South Wales medical school. He was also beloved by the Victor Chang students – we will all miss his presence at our weekly student lecture series where he generously and kindly gave his advice to our young researchers.

"We have been leading the way to transform cardiovascular disease from deadly to preventable."

Lastly, thank you for helping us to accomplish the successes and breakthroughs outlined in these pages. I would also like to thank the Trustees of the Mary Aikenhead Ministries, our Board led by Chairman Steven Lowy, and our committee members, and importantly our administrative team led so ably by our Chief Operating Officer, Dianne Kitcher. Together we will continue to fight heart disease and to perhaps even save the lives of those closest to us.

With your support, all of our researchers, staff and Friends (our supporters) can honestly say "I make a difference" when it comes to the fight against cardiovascular disease.



Professor Robert M. Graham AO
Executive Director

> **Knowing is not enough; we must apply. Willing is not enough; we must do.**
>
> Johann Wolfgang von Goethe (1749 – 1832)

Board of Directors

The successful operations of the Victor Chang Cardiac Research Institute are heavily reliant on the loyalty, drive and vision provided by the Board of Directors, led by Mr Steven Lowy AM, and its subsidiary committees.

Mr Steven Lowy
AM, B.Com (Hons) (Chairman)

Mr Lowy joined the Victor Chang Board as an inaugural member in 1995 and became Chairman in 2008. He currently serves as Co-Chief Executive Officer of the Westfield Group. Mr Lowy holds a Bachelor of Commerce (Honours) degree from the University of NSW. Prior to joining Westfield in 1987, he worked in investment banking in the United States. Mr Lowy is President of the Board of Trustees of the Art Gallery of New South Wales. He is a director of the Lowy Institute for International Policy, a member of the Prime Minister's Business-Government Advisory Group on National Security. Mr Lowy is a Life Governor of the Victor Chang Cardiac Research Institute.

Professor Robert M Graham
AO, FAA, MBBS (Hons), MD, FRACP, FACP, FAHA

Professor Graham is Executive Director of the Victor Chang Cardiac Research Institute, and a member of its Finance, Appeals, Intellectual Property and Commercialisation and Media and Communications Committees. He is the Des Renford Professor of Medicine, and Professor of Biotechnology and Biomolecular Science, University of NSW, and Professor (adjunct) of Physiology and Biophysics, Case Western Reserve University School of Medicine, Cleveland, Ohio. He is a Fellow, Australian Academy of Science (AAS) and foreign member, Royal Danish Academy of Sciences and Letters. He is a member of the American Association for Clinical Research, the American Society of Clinical Investigation and the American Heart Association, and a Life Member, Heart Foundation of Australia.

Mr David Craig
BEc, FCA, CTFP

Mr Craig joined the Victor Chang Board in 2007 and took over as Chair of the Institute's Finance Committee in 2012. Since 2006 he has been the Chief Financial Officer of the Commonwealth Bank of Australia. He is responsible for the overall financial frameworks of the bank, incorporating the areas of finance, audit, security, property, procurement and investor relations. Mr Craig has over 30 years of experience in financial management, strategy, mergers and acquisitions. His previous roles included: Chief Financial Officer for Australand; Global Transition Finance Leader for IBM Business Consulting Service; Global Chief Financial Officer of PwC Consulting, Chief Operations Officer and for 15 years Senior Audit Partner of PricewaterhouseCoopers Australasia. Mr Craig has also served as a director of Australian Gas Light Company.

Mr Craig is a Bachelor of Economics, a Fellow of The Institute of Chartered Accountants in Australia and a member of the Australian Institute of Company Directors. He is also a director of the Financial Executives Institute of Australia.

Mr Chum Darvall
BA, F Fin, FAICD

Mr Darvall joined the Victor Chang Board in 2008, and is a member of its Finance Committee. He was Chief Executive Officer, Deutsche Bank Australia and New Zealand, from July 2002 to March 2011. He is now non-executive Vice Chairman of Deutsche Bank. Prior to this he worked in a variety of roles across the banking industry including: Director of Treasury and Head of Global Markets at Deutsche Bank and positions in the financial markets division of Westpac. Mr Darvall's current Board memberships include: TransGrid, Wilson HTM, Pinnacle Investment Management Ltd, Metrics Credit Partners Pty Ltd, the Financial Markets Foundation for Children, Macquarie University Council, Major Performing Arts Board of the Australia Council and the Australian Cricketers Association Player Hardship Fund.

Mrs Louise Di Francesco

Mrs Di Francesco joined the Victor Chang Board in 2010 and is the Chair of its Appeals Committee. Mrs Di Francesco has worked in the media industry for more than 30 years, initially as a journalist, and for the past 22 years, in media and corporate communications. She is a specialist in all areas of corporate media management, public relations, issues management and crisis management, and has worked on campaigns for AAPT, CeBIT, Mercedes Australian Fashion Week, Alterian, Carbon Planet, Australand, Lend Lease, Multiplex, Colliers, Landcom and James Fairfax. Mrs Di Francesco is a board member of National not-for-profit organisation, Fitted for Work.

Mrs Barbara Ell

Mrs Ell has been a Victor Chang Board member since 2001 and is a Life Governor of the Institute. She is a member of the Institute's Appeals Committee and is the Chair of the Victor Chang Day Organising Committee. Mrs Ell was born in Auckland, New Zealand and educated at St Mary's College prior to her nursing training at Auckland Hospital. She then continued her nursing career at Merriwa District Hospital. After marrying, Barbara moved to Sydney, where she raised her three children, Justine, Sara and Robert. In addition to serving on the Victor Chang Appeals Committee, Barbara is widely recognised for her leadership in philanthropy and charity work.

Professor Leslie Field
AM, FAA, DSc, PhD, BSc

Professor Field joined the Victor Chang Board in 2009. He was appointed to his current position as Vice-President and Deputy Vice-Chancellor (Research) at the University of NSW in 2005. His main areas of research are organometallic chemistry, catalysis and NMR spectroscopy. He is the author of more than 200 scientific papers and 4 text books. He is the recipient of the Rennie Medal (1983); the Edgeworth David Medal (1986); the Organic Chemistry Medal (1992); the Centenary of Federation Medal (2003) and the RACI Leighton Medal (2010). He was elected as a Fellow of the Australian Academy of Science in 1996 and appointed as a Member of the Order of Australia in 2011 for his services to chemistry and to higher education.

“Dedication, commitment, vision.”

Board of Directors

Mr Angelos Frangopoulos
BA(Comm), MAICD, JP

Mr Frangopoulos joined the Victor Chang Board in 2009 and is a member of its Media and Communications Committee. He is the CEO of Australian News Channel Pty Ltd, the owner and operator of Sky News Australia and Sky News New Zealand. Before joining Australian News Channel, he held positions at British Sky Broadcasting, the Nine Network and Prime Television. Mr Frangopoulos is the Chairman of the Australia Day Council of NSW, a member of the Charles Sturt University Council, a member of the Advisory Board of Macquarie University's Centre for Media History, and a director of the Australian Subscription Television and Radio Association.

Sr Anthea Groves
RSC, OAM, RN LHA Dip. of Nursing Administration

Sr Anthea Groves has been a member of the Victor Chang Board since 2003. She is a member of the congregation of the Sisters of Charity and is Patient Liaison Officer at St Vincent's Hospital Sydney. Sr Anthea is a director of the Sisters of Charity Foundation.

Mr John Kean
OAM, FCA, FAICD

Mr Kean has been a member of the Victor Chang Board since 2003, is a Life Member of the Institute and was the Chair of the Institute's Finance Committee until retiring from this position in 2012. He is Executive Chairman of Pinpoint Pty Limited. He also acts as an Independent Business Advisor and holds directorships in various businesses involved in marketing, finance, education, primary production, property and healthcare. In addition to serving as a director of the Victor Chang Institute, he was an inaugural member of its Appeals Committee.

Ms Jill Margo
AM, BA (Hons)

Ms Margo joined the Victor Chang Board in 2008 and is the Chair of the Institute's Media and Communications Committee. She is a medical journalist on *The Australian Financial Review*. She has won numerous international and national media awards, including two Walkleys and a Churchill Fellowship. Since 2000, she has been a member of working parties charged with developing clinical and consumer guidelines for the management of prostate cancer. In 2006, Ms Margo was awarded an Order of Australia for services to journalism and cancer. She holds a BA (Honours) in English literature, and is a best-selling author and biographer.

Mr Ryan Stokes
BCom

Mr Stokes joined the Victor Chang Board in 2011. He is CEO of Australian Capital Equity Ltd (ACE) and Chief Operating Officer of Seven Group Holdings (SGH). Mr Stokes is also a director of WesTrac, Seven West Media and Iron Ore Holdings. He is the Chairman of The National Library of Australia and a director of the Australian Strategic Policy Institute Council.

Dr Gary Weiss
LLB (Hons), LLM, JSD

Dr Weiss joined the Victor Chang Board in 2009 and is a member of its Finance Committee. He holds the degrees of LL.B (Hons) and LL.M (with dist.), as well as a Doctor of Juridical Science (JSD) from Cornell University, New York. Dr Weiss is Chairman of Secure Parking Pty Ltd, an Executive Director of Ariadne Australia Limited and a director of several other organisations, including Clearview Wealth Ltd (Chairman-elect), Premier Investments Limited, Ridley Corporation Ltd, Pro-Pac Packaging Ltd and The Centre for Independent Studies.

Our Committees

APPEALS COMMITTEE

The Appeals Committee consists of a group of volunteers and staff who are responsible for the Institute's fundraising events, aimed at raising the vital funds needed by the Institute to conduct its groundbreaking research.

Members

Mrs Louise Di Francesco (Chair), Mrs Ann Chang, Mr Marcus Chang, Mr Alan Crouch, Mrs Barbara Ell, Mr Errol Goldberg, Prof Bob Graham, Mr Peter Homan, Mr Cameron Irving, Ms Dianne Kitcher, Mr Ross Koscharsky, Mr Das Menon, Sr Clare Nolan RSC, Mrs Antoinette Ogilvie, Mr Michael Renford, Mr Robert Ryan, Ms Jan Savage, Mr John Shim, Ms Ruth Zukerman Attendees: Ms Jayne Baric, Ms Anna Dear, Ms Eliana De Sousa.

FINANCE COMMITTEE

The Finance Committee is responsible for the oversight of finances for the Board of Directors. The Committee oversees the audit of the Institute's accounts, investment management, management remuneration and also sets finance policy for management to follow.

Members

Mr David Craig (Chair from May 2012), Mr John Kean (Chair, until April 2012), Mr Chum Darvall, Dr Gary Weiss, Prof Bob Graham, Ms Dianne Kitcher, Mr Kiran Narsey and Ms Jan Savage.

MEDIA AND COMMUNICATIONS COMMITTEE

The Media and Communications committee is responsible for the overall strategic direction of marketing and communications activities at the Institute. The committee meets bi-monthly and seeks to bring new ideas in traditional and emerging media platforms to promote the work of the Institute.

Members

Ms Jill Margo (Chair), Mrs Louise Di Francesco, Mr Angelos Frangopoulos, Ms Anna Dear, Ms Dianne Kitcher, Ms Jan Savage, Prof Bob Graham.

VICTOR CHANG DAY ORGANISING COMMITTEE

This committee is responsible for organising the Institute's major annual fundraising event, the Victor Chang Day Gala Ball.

Members

Mrs Barbara Ell (Chair), Mrs Ann Chang, Mr Cameron Irving, Mr Ken Laing, Ms Emma Quick, Mrs Michele Parker, Mrs Diana Ritchie, Ms Ruth Zukerman, Ms Jan Savage, Ms Eliana De Sousa, Prof Bob Graham.

SCIENTIFIC ADVISORY BOARD

The Scientific Advisory Board comprises six internationally-renowned scientists, who carry out an exhaustive evaluation of the Institute's research programs every five years, to ensure the Institute remains at the cutting edge of cardiovascular knowledge generation and continues to produce research of a world-class standard.

Members

- Professor Doug Hilton (Chair) – Director Walter and Eliza Hall Institute, Australia
- Emeritus Professor John Chalmers – Senior Director and Head, Professorial Unit, The George Institute for International Health and University of Sydney, Australia.
- Professor Witold Filipowicz – Professor of Biochemistry, Friedrich Miescher Institute for Biomedical Research (FMI), Switzerland.
- Professor Lily Jan – Jack and DeLoris Lange Professor of Physiology and Biophysics, University of California, USA.
- Professor Janet Rossant – Chief of Research, The Hospital for Sick Children, Canada.
- Professor Stephen Vatner – Chairman, Department of Cell Biology and Molecular Medicine, New Jersey Medical School, USA.

FACULTY REVIEW COMMITTEE

The Faculty Review Committee comprises eminent scientists from local research organisations who evaluate individual faculty members every five years in order to assess their productivity, promote the development of goals and expectations, foster and support faculty development and mentorship, and guide junior faculty in career advancement.

Members

- Professor John Shine (Chair) – Professor of Medicine and Professor of Molecular Biology, The University of New South Wales, Group Leader Neural Stem Cells, Garvan Institute of Medical Research.
- Professor Peter Gunning – Head, Oncology Research Unit in the School of Medical Sciences, The University of New South Wales.
- Professor John Rasko – Professor of Medicine, Central Clinical School, The University of Sydney and Centenary Institute of Cancer Medicine and Cell Biology.
- Professor Phil Robinson – Head, Cell Signalling Unit, Children's Medical Research Institute, Westmead.

Our volunteer committee members are vital to our work and progress. Their support and advice is integral to our research success.

COMMITTEE ON APPOINTMENTS AND PROMOTIONS

The Committee on Appointments and Promotions meets on an ad hoc basis to evaluate potential candidates for faculty positions within the Institute.

- Professor Bob Graham (Chair) – Executive Director, Victor Chang Cardiac Research Institute.
- Professor Terry Campbell – Senior Associate Dean, The University of New South Wales.
- Professor David Celermajer – Scandrett Professor of Cardiology, Central Clinical School, The University of Sydney and Heart Research Institute
- Professor Richard Harvey – Co-Deputy Director, Victor Chang Cardiac Research Institute.
- Professor Doug Hilton – Director, The Walter and Eliza Hall Institute
- Professor Levon Khachigian – Centre for Vascular Research, The University of New South Wales.
- Professor Charles Mackay – Department of Immunology, Monash University, Melbourne.
- Professor John Mattick – Executive Director, The Garvan Institute of Medical Research
- Professor Jamie Vandenberg– Co-Deputy Director, Victor Chang Cardiac Research Institute.

Ad hoc appointments

- Professor Terry Speed – Walter and Eliza Hall Institute
- Dr Joel Mackay – The University of Sydney

INTELLECTUAL PROPERTY AND COMMERCIALISATION COMMITTEE

The Intellectual Property and Commercialisation Committee (IPCC) is responsible for advising the Institute on its research commercialisation activities. The Institute has also appointed consultants TM Ventures to assist with linking our research to industry and forming new collaborations.

Members

- Professor Bob Graham (Chair) – Executive Director, Victor Chang Cardiac Research Institute.
- Dr Trevor Davies – Partner, Allens Patent and Trade Mark Attorneys.
- Professor Joan Dawes – Senior Consultant, Pestat Ltd; and Innovation Dynamics consulting group.
- Ms Britt Granath – Senior Policy Officer, Victor Chang Cardiac Research Institute.
- Ms Dianne Kitcher – Chief Operating Officer, Victor Chang Cardiac Research Institute.
- Professor Roland Stocker – Head, Vascular Biology Division, Victor Chang Cardiac Research Institute
- Ms Elisabeth White – Senior Associate, Baker McKenzie.

Vale Paul Ivan Korner

AO, FAA, BSc, MSc, MBBS, MD (USyd), DSc (Hon, UNSW), MD (Honoris Causa, UMelb), FAHA, FCSANZ

18 November, 1925 – 3 October, 2012

It is with great sadness that we advised of the passing of a wonderful friend and mentor, Australia's pre-eminent cardiovascular scientist, Professor Paul Korner in 2012.

Paul was born in Czechoslovakia in 1925 moving to England with his family when he was 13 to escape the Nazis. After a year in England the family moved to Australia. He graduated from Medicine at the University of Sydney in 1951 after having finished a BSC (1946) and an MSc (1947). He then went on to the Kanematsu Research Institute at Sydney Hospital, the Royal Postgraduate Medical School, London and then to Harvard. On his return to Australia he took a senior lecturer position at Sydney Uni followed by Foundation Chair in Physiology at UNSW, foundation Scandrett Professor Cardiology at the Sydney Uni and then the director of the Baker Medical Research Institute in Melbourne.

Even after his retirement, Paul continued to take an active interest in cardiovascular research and mentoring young scientists especially at the Victor Chang Institute where a weekly seminar series, named in his honour, gives young scientist the opportunity to present their work. He is sadly missed by his family and all that knew him.

REFLECTIONS ON PAUL KORNER
ROBERT M GRAHAM, EXECUTIVE DIRECTOR

Over the years Paul went from being teacher, to mentor to close personal friend and valuable advisor as I stumbled to establish the Victor Chang Cardiac Research Institute. Soon after, given his enormous contributions to me personally and to cardiovascular research in general, it occurred to me that it would be most appropriate to name an academic/teaching initiative in Paul's honour, and thus began the Paul Korner Lecture Series, that is now one of the Institute's hallmarks – given weekly by one of our young trainees, it carries a prize each year for the best presentation, which is highly sought after.

The most enjoyable aspect of these seminars was that Paul took a personal interest in them and attended them religiously whenever he could. He also attended our annual Christmas function at which he gave out the prize to that year's winner and runner--up of the seminar series.

Over many years of attending the Paul Korner Lectures, Paul interacted with ease with our young people and always joined our morning tea get--togethers after the lecture, where he mingled freely with our trainees and faculty, listening, giving advice and being constructively critical. This is so aptly described in the following eulogy, sent by one of our young trainees, Chris Blair.

"Professor Korner unfailingly arrived at the Institute in good time each Wednesday morning to attend the seminar series that will always bear his name. For at least half an hour before the seminar commenced he was often to be found sitting in the lobby, happy to chat with anyone who approached him, whether it was a senior Faculty member or a PhD student. With an hour of vigorous scientific discussion to come, it seemed to a young scientist that these prior exchanges were by convention reserved for salutations and cordial catching-up, before battle commenced and the conversations became 'all business'.

"One morning, I decided to push my luck. I headed for the lobby, somewhat uncertainly, with a laptop containing a considerable amount of data, hopeful that I might be lucky enough to get a few words of advice (of the analytical kind) before the seminar began. Fortunately, Professor Korner wasn't in conversation when I arrived. As I approached him he spied the laptop, partly ajar, and immediately had the measure of me. But my timidity was misplaced. Before I'd said a word he invited me to sit down, and without hesitation spent the next 40 minutes unhurriedly scrutinizing my designs, listening to my methods, and offering useful new perspectives on the findings I described to him. The work concerned a rather involved investigation of a particular type of stem cell therapy for the heart, yet it didn't for a second seem that this was 'not his area'. As a vastly experienced scientific director, his analytical mind effortlessly straddled the ages and fads of scientific vogue, and he discussed my findings like he'd been thinking about such details for years (and he may well have been!). And of course, detecting my trepidation, he engaged me with the congenial air of an experienced supervisor, making suggestions rather than criticisms, and hinting at alternative interpretations upon which he then encouraged me to hang my own ideas.

"Emeritus Professor Korner led a celebrated and consequential life, so I'm proud that it contained this simple moment, shared with me. Often, to the wider world, one of the most poignant ironies in an eminent scientist's passing is that the ensuing tributes illuminate their personality with a hitherto under-appreciated humanity that can now no longer be enjoyed first-hand. We at the Victor Chang, and numerous others beyond, felt Professor Korner's warmth and humanity and are the richer for it."

Paul was such an incredible person, larger than life – he could be gruff and demanding, he called a spade a shovel, but to his credit, although holding strong opinions, was prepared to change his mind when a cogent counter--argument was presented. He was also warm and sympathetic. His intellect knew few peers – he was a leader, a pioneer, the consummate academic!

Above: A portrait of Paul Korner, commissioned by the Institute, was unveiled at the 2012 Christmas Function. Artist Mathew Lynn (middle) is pictured with Anthony Korner, Val Korner, Ann Korner, Nicholas Korner and Bob Graham.

“We at the Victor Chang and numerous others beyond, felt Professor Korner’s warmth and humanity and are the richer for it.”

Research Divisions: Overview

“Although scientific research is usually regarded as a marathon, not a sprint, this year has been marked by some world-first discoveries that have directly helped families live free from the burden of disease.”

Professor Bob Graham AO, Executive Director.

CARDIAC PHYSIOLOGY AND TRANSPLANTATION DIVISION

Feneley Laboratory
Macdonald Laboratory
O'Rourke Laboratory
Keogh Laboratory

1

DEVELOPMENTAL AND STEM CELL BIOLOGY DIVISION

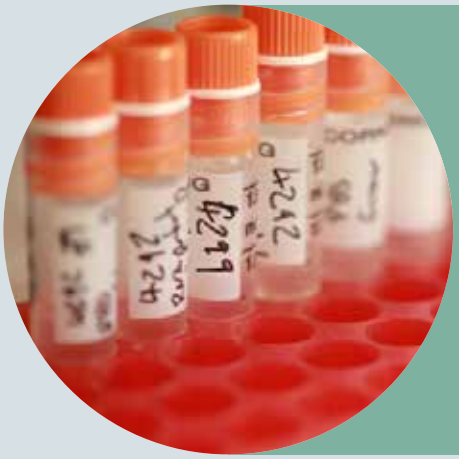
Harvey Laboratory
Dunwoodie Laboratory
Kikuchi Laboratory

2

MOLECULAR CARDIOLOGY AND BIOPHYSICS DIVISION

Graham Laboratory
Vandenberg/Hill Laboratories
Fatkin Laboratory
Martinac Laboratory

3



MOLECULAR GENETICS DIVISION

Suter Laboratory

4

STRUCTURAL AND COMPUTATIONAL BIOLOGY DIVISION

Stock Laboratory
Lee Laboratory

5

Cardiac Physiology and Transplantation Division

FENELEY LABORATORY

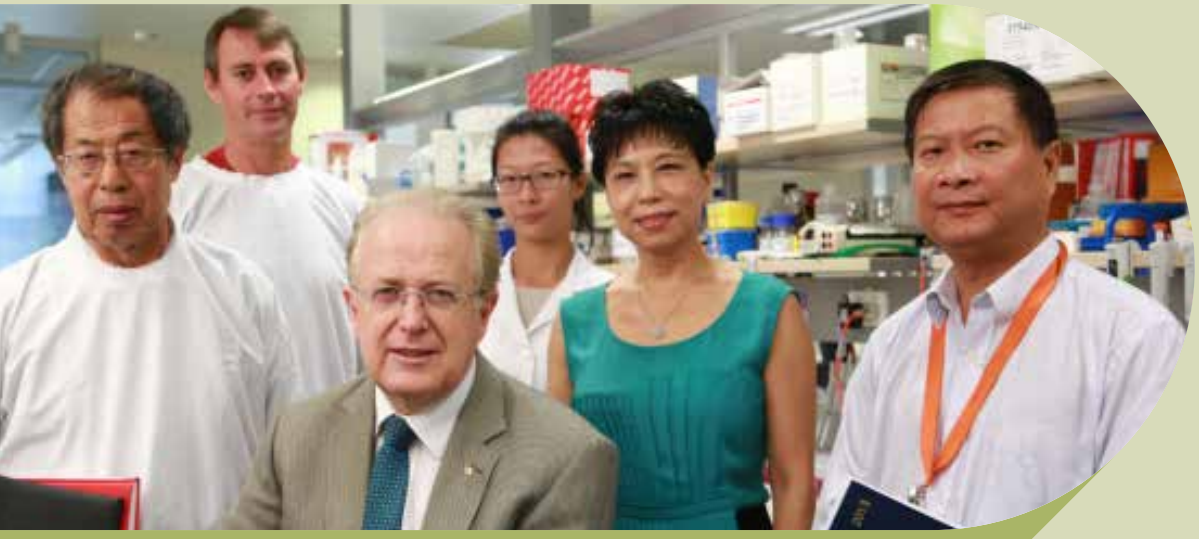
The Cardiovascular Mechanics Research Program, headed by Professor Michael Feneley, has developed sophisticated approaches to directly measure how well a heart is able to function and contract.

For each beat of your heart, the individual muscle cells that make up the heart contract in a coordinated way to pump blood around the body and supply it with oxygen and nutrients. Unlike skeletal muscle cells, which move our arms and legs, heart cells can contract without nerves being attached to them. The cells of the heart communicate with each other by passing electrical signals to their neighbours, which allows the coordinated contraction of the heart. In some people, heart muscle cells are lost if injured, so the heart pumps less effectively. This limits one's ability to exercise, or in severe cases causes the heart to fail.

In 2012, the Feneley Laboratory in collaboration with Prof Bob Graham's team, discovered a novel protein, called RhoA, that regulates how heart muscle cells spontaneously contract in the absence of signals from the nervous system.

Although previous studies have looked at the role RhoA plays in causing excessive thickening of heart muscle (called hypertrophy), its role in regulating contraction of the normal heart was completely unexpected.

In June 2012, Professor Feneley was awarded the Order of Australia Award for his services to medicine in the field of cardiology as a clinician, researcher and educator, through contributions to professional organisations and to the community.



"Improving heart failure survival, better heart transplants – saving more lives."

MACDONALD LABORATORY

Heart transplantation is by far the most effective treatment for patients with advanced heart disease. Due to the scarcity of suitable donor organs, its application is currently limited to only a small percentage of people who could benefit. Professor Peter Macdonald's research group is working on novel methods of donor management and donor heart preservation with the aim of being able to extend this life-saving treatment to a larger number of Australians.

In 2012, the group had a number of major achievements, including the acceptance of two research papers for publication in the Journal of Heart and Lung Transplantation and the American Journal of Transplantation. Their research was aimed at assessing the viability of using hearts from donation after circulatory death (DCD) donors which are not currently used in transplantation. With the purchase of a new Transmedics Organ Care System that provides superior organ preservation, the group found that DCD hearts are a viable source of organs in cardiac transplantation. This could improve the number of organs available for transplant by as much as 20 per cent. The Macdonald Laboratory will continue to assess the viability of using DCD donors and start clinical trials in 2013.

> **"The best scientist is open to experience and begins with romance – the idea that anything is possible."**
>
> Ray Bradbury

Cardiac Physiology and Transplantation Division

O'ROURKE LABORATORY

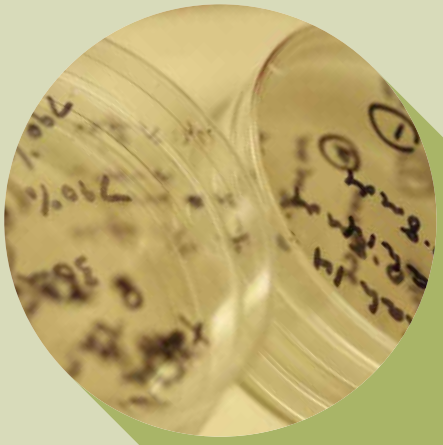
The focus of the Vascular-Ventricular Interactions Laboratory, led by Professor Michael O'Rourke, is on pulsatile pressure/flow relationships in arteries and its implications of arterial stiffening with age. Its focus is on the largest artery, the aorta, and the tiny arteries in the brain. Working with colleagues in Paris, the group has shown that new Magnetic Resonance techniques enable accurate measurement of aortic flow, and better non-invasive description of cardiac load than was previously possible. With colleagues in Shanghai, the group is concluding analysis of cerebral flow waves and their change with age; these confirm a view that cognitive decline and dementia in the elderly is caused by tiny cerebral artery rupture in response to impaired ability of the stiffened aorta to cushion pulsations. Development of aortic 'wrap' to improve aortic distensibility is being pursued to cushion pulsations with Alberto Avolio and colleagues in Sydney, and with groups at the Massachusetts Institute of Technology in Boston and Yale University, after securing patent protection in the United States.

KEOGH LABORATORY

Professor Anne Keogh's research group focuses on pulmonary arterial hypertension (PAH) and left heart failure. In 2012, PAH patients benefited from trials conducted by the group which provided them with double and triple therapies and reduced morbidity and mortality. Five major trials have been completed and three new trials are currently underway. The world's first Potts shunt in an adult with PAH was also performed successfully in 2012. A Potts shunt is a procedure that reduces the high pressure in the pulmonary vessels that the right side of the heart has to pump against, by making a connection between the descending aorta and the left pulmonary artery. Professor Keogh was invited to be Taskforce Co-chair for the World Society Pulmonary Hypertension guidelines in Nice 2012-2013, and a high level of publication continues. In June 2012, Professor Keogh was awarded an Order of Australia Award for her services to cardiac transplantation, heart failure, pulmonary hypertension and animal welfare.

MULLER LABORATORY

Under the leadership of Associate Professor David Muller, this program investigates new treatments to prevent, treat and reverse coronary artery disease and prevent heart attacks, particularly in patients who have received a heart transplant.



CLINICAL FACULTY (ST VINCENT'S HOSPITAL)

Professor Terry Campbell
Dr Kumud Kumar Dhital
Associate Professor Chris Hayward
Dr Andrew Jabbour
Associate Professor Jane McCrohon
Dr Jacob Sevastos
Dr Phillip Spratt
Associate Professor Rajesh Subbiah

> “It’s hugely exciting research. We hope that these types of hearts could become a major source for transplantation in the future.”

Science in the Spotlight

A NEW ERA IN HEART TRANSPLANTATION

In 2009, Professor Peter Macdonald led a team that discovered a world-first preservation technique that almost doubles the life of donor hearts being transported for transplant surgery. That preservation solution is now being tested clinically at St Vincent's Hospital Sydney.

Whilst heart transplants are a life-saving procedure, they are severely limited by the availability and supply of suitable donor organs. Flashforward to 2012 and the Macdonald Laboratory has continued on its quest to improve the pool of donor organs available for transplant.

Throughout the year, the researchers embarked on a number of new projects aimed at finding a way to use hearts not usually considered for transplantation – those from donors in which the heart has stopped beating, or 'donation after circulatory death' (DCD) donors.

"At the moment we don't use DCD donors for heart transplants, because there is a concern that these hearts have suffered irreversible damage – to the extent that they will fail if transplanted into a recipient," said Professor Macdonald, Head of the Cardiac Transplant Laboratory at the Institute.

"But we believe that this damage is actually reversible – and that these hearts have the potential to be successfully used for transplantation, particularly those from younger DCD donors," added Professor Macdonald.

In a two-part process, the group made some exciting discoveries throughout the year, that will significantly improve the number of organs that can be considered for transplant – and in doing so, are heralding a new era in heart transplantation in Australia and around the world.

First, with funds provided by the John T Reid Charitable Trusts during the year, the group purchased a Transmedics Organ Care System (OCS) – a system designed to maintain organs in a warm, functioning state outside of the body, increasing the amount of time a donated organ can stay in a condition suitable for transplant and reducing injury caused by lack of oxygen to the organ.

Second, through a number of experiments using the OCS and a porcine model to mimic human transplantation, the group were able to demonstrate viable functioning of the heart 30 minutes after withdrawal of life support, and partial recovery after 40 minutes when the heart storage solution was supplemented with 3 different drugs.

The addition of supplements to the storage solution extended the time during which the heart can be fully recovered after withdrawal of life support from 20 to 30 minutes.

This timeframe could make human hearts from DCD donors clinically viable.

"DCD donation is the fastest growing form of deceased organ transplantation and based on the current number of DCD donors, we believe that using these donors could increase the number of heart transplants in Australia by as much as 50 per year," added Professor Macdonald. "It's hugely exciting research. We hope that these types of hearts could become a major source for transplantation in the future."

The group will continue working on further experiments to confirm the viability of using DCD organs and hope to start clinical trials in the near future.

Developmental and Stem Cell Biology Division

HARVEY LABORATORY

The heart is a precision muscular pump that is controlled by an in-built electrical circuitry and the hormonal responses of the body. The Harvey Laboratory, led by Institute Deputy Director Professor Richard Harvey, studies how the heart forms in the embryo and how it repairs itself in the adult. The heart begins to function after only a few weeks of embryonic life when it is still a simple muscular tube. As heart structure develops further through the addition of valves, specialised chambers and a more sophisticated electrical system, its function also becomes more adapted to the needs of the growing embryo.

The forming heart seems especially vulnerable to defects in the genes that control its formation. This is why structural malformations of the heart (congenital heart disease) are relatively common in newborn children. The group is also looking to understand how gene defects cause heart defects, and how this information can be used to help families with congenital heart disease.

In the adult, heart attack is common and remains one of our greatest killers. The death of large segments of heart muscle is not easily repaired naturally, but there is hope that if we can understand how other types of tissues (such as our skin or liver) regenerate, we can encourage this to occur in the injured heart. This is one of the new challenges the Harvey Laboratory is addressing.

Over the last year, the group has made a number of advances in these areas. Highlights include showing that one of the regulatory genes for heart muscle formation in the embryo, *NKX2-5*, is also involved in spleen development and regeneration. The group studied a family in which members lack spleens entirely and carry a mutation in the *NKX2-5* gene.

The Harvey group has also discovered how the key heart regulator, *NKX2.5*, instructs cells to stop expanding by cell division, and instead mature into specialised heart muscle cells, whose main role is to make the heart beat.

A stem cell is a 'blank slate' cell that has the ability to develop into many of the types of cells found in the body. Stem cells are used to repair tissues like the skin, blood, gut and bones when they have been damaged. Previously, the group discovered that the heart also contains stem cells, which are similar to but distinct from those found in the bone marrow.

These cardiac stem cells can be distinguished from other types of stem cells by the unique markers found on the surface of the cells. These molecules may one day be useful for harnessing these cells and encouraging them to repair the heart after injury.

“How to make a heart”

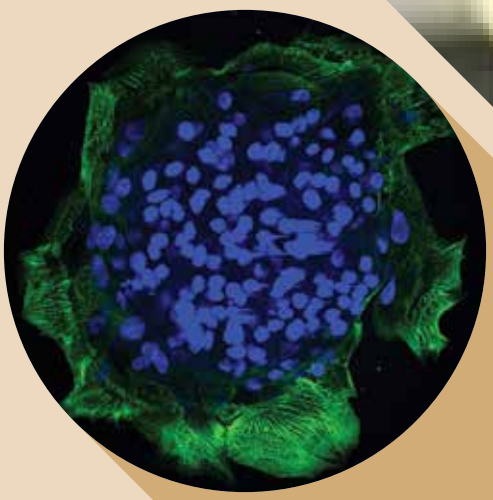


Image: “Cells in Bloom”, courtesy of Dr Alexis Bosman, Harvey Laboratory. Image shows a tiny cluster of heart cells, cardiomyocytes, derived from induced pluripotent stem cells.

"I was taught that the way of progress was neither swift nor easy."

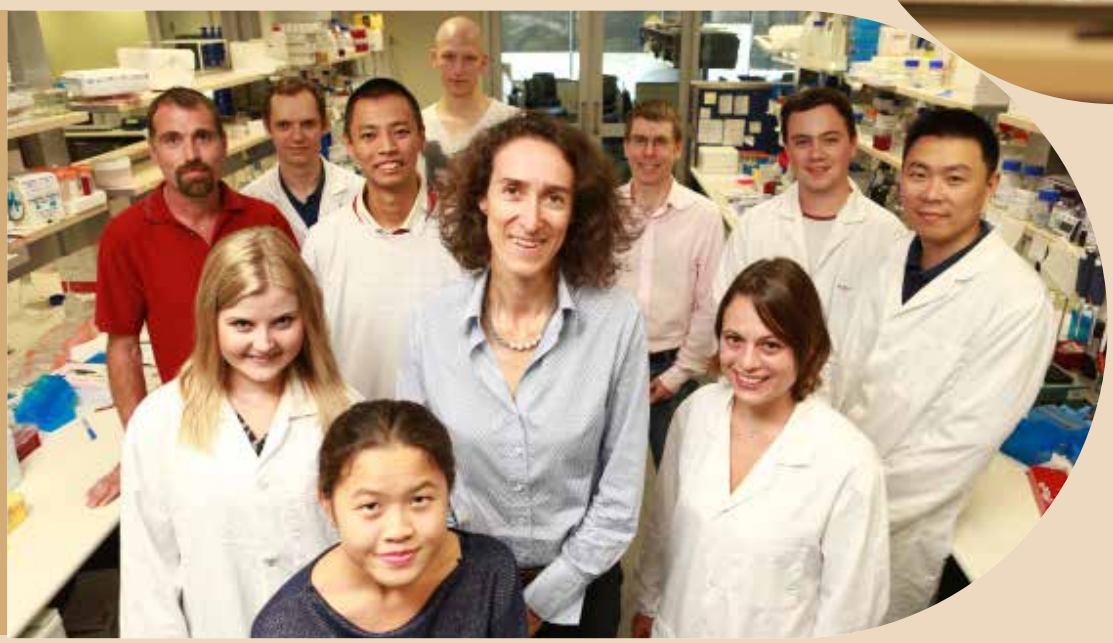
Marie Curie

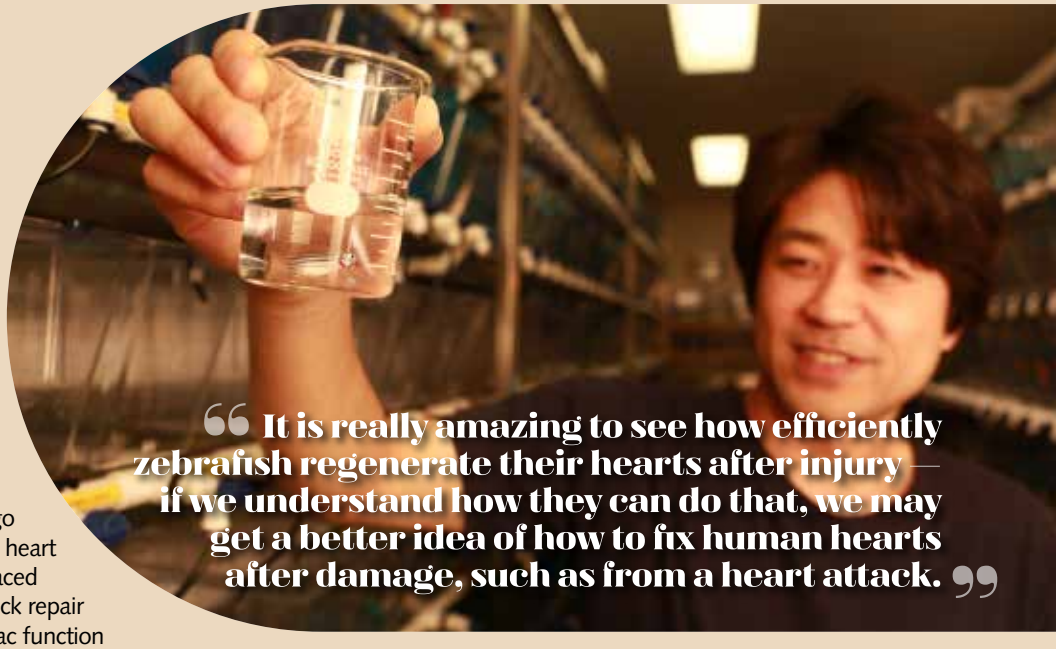
DUNWOODIE LABORATORY

A third of all babies born have some form of birth defects. In some instances they are not life threatening but they do cause disability and distress. In other instances they are indeed life threatening and surgery, often many times over, is required. In only about 20 per cent of cases is the cause of the defect understood, leaving thousands of families each year in Australia wondering why they have been affected. Research in the Embryology Laboratory, led by Professor Sally Dunwoodie, is focused on embryonic development, as birth defects arise if developmental processes are disrupted. What factors are likely to disrupt developmental processes? The genetic code of the embryo, environmental factors during gestation, or both? The Dunwoodie Laboratory are identifying genes that are required for the normal development of the heart or vertebral column for example, and seeing if these genes are altered in babies born with defects. The group is also exploring how environmental insults during gestation, such as low oxygen (hypoxia), impact on embryo development. Identifying gene alterations and environmental insults that cause birth defects will help solve the mystery concerning some of the 80 per cent of cases that occur each year.

In 2012 the group published an article in one of the top international journals, Cell, describing how hypoxia, or a period of low oxygen during pregnancy, combined with a genetic risk factor of having only one functioning copy of a gene, dramatically increases the chances of a baby being born with congenital scoliosis, a malformation of the spine that affects around 1 in 1000 babies. These findings take us a step closer to understanding why some people in families develop diseases and others don't, and why birth defects often skip generations. And importantly, could lead to simple strategies to prevent such defects by mothers potentially caring a baby at risk.

The group studied individuals with congenital scoliosis and found that having just one, instead of two functioning copies of a known gene from either mum or dad, was a major risk factor for causing abnormal formation of vertebrae in embryonic development. They then went on to test the genetic risk factor in a mouse model combined with an environmental 'insult' in the form of hypoxia. Importantly, they found a marked increase in spinal abnormalities in the offspring, when the mothers were exposed to only 8 hours of low oxygen during an entire 21-day pregnancy. This brief period of low oxygen essentially disrupted the pathway responsible for development of the spine and we know that the same pathway is used in the development of limbs and many organs, including the heart, kidneys, brain and craniofacial development. This study provides a new paradigm for the interaction between environment (nurture) and our genes (nature), which may account for a lot of diseases that we have not understood before. In time it may lead to simple strategies to prevent thousands of birth defects.





> “It is really amazing to see how efficiently zebrafish regenerate their hearts after injury — if we understand how they can do that, we may get a better idea of how to fix human hearts after damage, such as from a heart attack.”

KIKUCHI LABORATORY

The major interest of the Cardiac Regeneration Laboratory, led by Dr Kazu Kikuchi, is to understand the mechanisms of heart regeneration. In mammals and indeed humans, the heart does not undergo regeneration after damage, such as from a heart attack. Instead, the damaged tissue is replaced by fibrotic scar tissue, which provides a quick repair from the damage, but fails to restore cardiac function and increases susceptibility to heart failure.

By contrast, some vertebrates such as salamander and fish are known to naturally regenerate heart muscle with little scar formation after injury. The Kikuchi Laboratory uses the zebrafish, a small tropical freshwater fish which is highly amenable to genetic manipulations, to study the molecular and cellular regulations of heart muscle regeneration. The group has a long-term objective of finding out how this type of regeneration might be used to repair damaged human hearts.

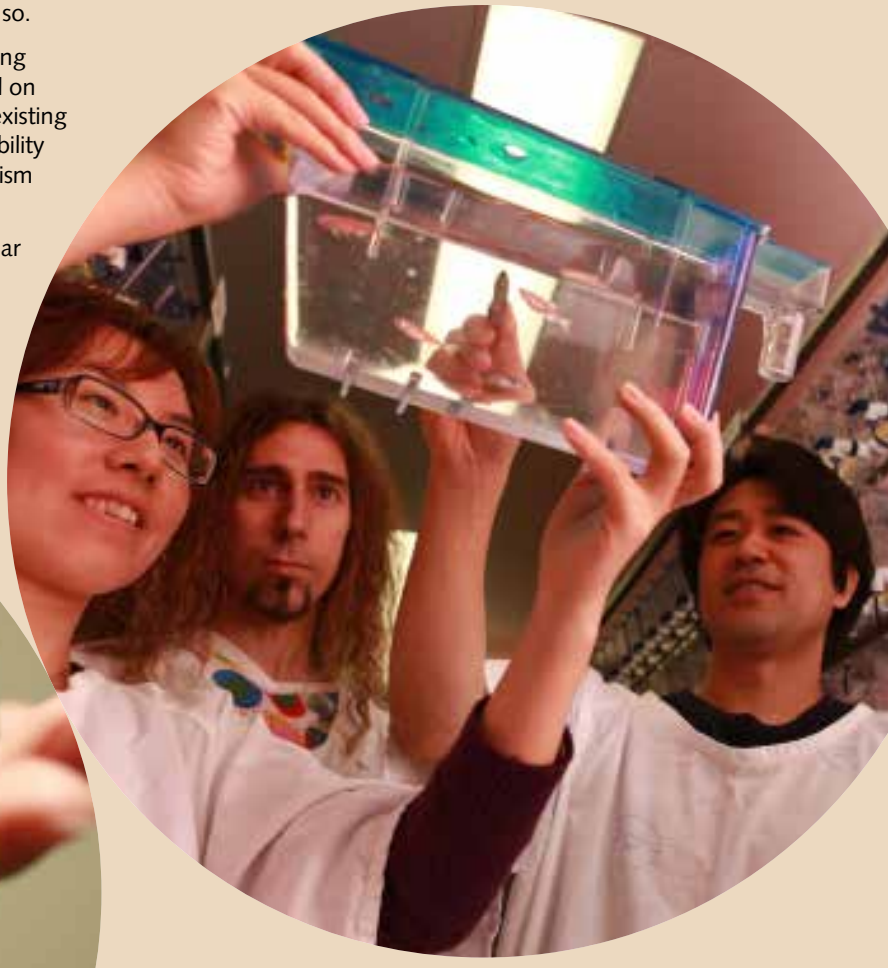
In humans, we know that stem cells – a type of ‘blank slate’ cell that has the ability to grow into any cell type – are responsible for generating new tissues, and also repair and regenerate damaged and ageing tissues. The liver has many stem cells and regenerates itself very well after damage; the human heart muscle less so.

A previous study led by Dr Kikuchi showed that regenerating a damaged zebrafish heart muscle is surprisingly not based on stem cells, but involves the activation and dividing of the existing heart cells (called cardiomyocytes). Mice also have some ability to repair damaged heart muscle by using a similar mechanism to the zebrafish

The Kikuchi Laboratory is further investigating the molecular mechanisms that induce the growth of new heart cells in the injured zebrafish heart. It is hoped that the results from this project may lead to the development of molecules that stimulate new heart cells to grow in the damaged human heart.

Another area of interest in the Kikuchi Laboratory is to understand how the zebrafish heart is able to regenerate without much scar formation. Inflammatory responses provoked by injury often result in fibrotic scar formation in damaged organs in mammals. As in mammalian hearts, massive inflammation does occur in the zebrafish heart after injury, but the consequences are quite different: the zebrafish heart regenerates without scar tissue formation.

Supported by a National Health and Medical Research Council project grant starting in 2013, the team will investigate the role of inflammatory cells during zebrafish heart regeneration with particular focus on macrophages – the white blood cells that patrol the body and act like garbage disposal units by picking up debris and dead cells.



Science in the Spotlight

NATURE AND NURTURE: WORLD-FIRST DISCOVERY SHEDS NEW LIGHT ON CONGENITAL BIRTH DEFECTS

Capping off 2011 with a promotion to full Professor, Sally Dunwoodie, Head of the Embryology Laboratory, went from strength to strength in 2012. In April, she led a team to a landmark discovery published in the prestigious international journal, Cell. In October, she was named in the Sydney Magazine's annual 'Top 100' list, as one of Sydney's most influential "Thinkers".

The *Cell* discovery was a breakthrough for women around the world, and could give rise to new ways of helping to minimise or even avoid the risk of having a baby born with congenital birth defects.

Dunwoodie's team at the Victor Chang Institute showed for the first time how 'nature' and 'nurture' interact to increase the severity and likelihood of developing a range of birth defects, including abnormalities in the heart, kidneys, brain, limbs and cranio-facial regions (cleft palate).

They showed how hypoxia, or a period of low oxygen during pregnancy, combined with a genetic risk factor of having only one functioning copy of a gene, dramatically increases the chances of a baby being born with congenital scoliosis, a malformation of the spine that affects around 1 in 1000.

Dunwoodie says the findings take us a step closer to understanding why some people in families develop diseases and others don't, and importantly, simple strategies that mothers could adopt to help prevent such defects occurring.

"We've long suspected that it is genes or our environment that cause birth defects, but up until now, the majority of these have been largely unknown. This is the first time anyone in the world has shown that both 'nature' and 'nurture', in combination, are molecularly responsible for causing many birth defects.

"This research is hugely exciting and will help us to genetically diagnose a whole range of birth defects, and give advice to women on how and when to avoid certain activities when pregnant. We hope it will eventually lead to the development of therapeutics to stop these defects occurring in the first place."

Hypoxia during pregnancy can be caused by a range of circumstances, such as poorly controlled sugar levels in diabetics, smoking, high altitude, prescription and recreational drug-use, anaemia or a poorly functioning placenta.

Professor Dunwoodie took a gene fault isolated from two families with newborns affected by congenital scoliosis and then genetically altered mice to carry the same mutation. They found that the combination of the genetic risk as well as exposure to a brief period of low oxygen, resulted in their subjects being up to 10 times more likely to develop congenital scoliosis than those that only had the genetic risk factor.

Around 25 per cent of patients with congenital scoliosis also have some form of congenital heart defect, indicating that a single environmental 'insult' such as hypoxia, can potentially affect the development of more than one organ in the body.

"The study provides a new paradigm for the interaction between our genes and environment, and may account for a lot of diseases that we haven't understood before, such as many different forms of congenital heart disease, and conditions like cleft palate," added Professor Bob Graham, Executive Director of the Institute.

The team have begun working on similar studies specifically into congenital heart defects, which affect around 1 in every 100 babies born in Australia every year.

“This is the first time anyone in the world has shown that both ‘nature’ and ‘nurture’, in combination, are molecularly responsible for causing many birth defects.”

Molecular Cardiology and Biophysics Division

FATKIN LABORATORY

In dilated cardiomyopathy (DCM) the chambers of the heart enlarge and the heart's pumping action becomes weak. Eventually, the only option may be a heart transplant.

DCM often runs in families and Associate Professor Diane Fatkin and her team study the genes that are associated with this disease. 2012 was an exciting year for the Fatkin Laboratory with two major papers published in the *Journal of the American College of Cardiology*. Both of these were collaborative studies with Prof. Jamie Vandenberg's team.

The first study investigated a large family in which many family members had been diagnosed with DCM. The Fatkin team found a mutation in the *SCN5A* sodium ion channel gene that caused DCM and abnormal heart beats in many of the family members.

Ion channels are pores that poke through the walls of beating heart cells. The pores open and close to allow millions of charged sodium or potassium atoms to cross the cell wall – and so transfer electrical current from one cell to another. If this channel isn't opening or closing properly, the electrical currents aren't transferred around the heart correctly, leading to abnormal heart beats.

This gene mutation discovered by the Fatkin and Vandenberg teams was found to make the pore stay open and pump charged ions into the channel much too quickly. The research teams used a combination of experimental and computer modelling studies to predict the outcome of using drugs that block the sodium channel. These drugs were then shown to have dramatic benefits in the affected family members. These findings provided a clear example of how finding the genetic cause of DCM can lead to specific treatment and avoid the potential need for expensive heart failure therapies, hospitalisations and possibly even heart transplantation.

In another study, the two teams of researchers hypothesised that some rare genetic variations acting alone may have little effect on heart disease, but if inherited together might cause a 'double whammy' or even 'triple whammy' effect.

The researchers analysed all the major potassium ion channel genes in several families with atrial fibrillation (AF). In AF, the upper chambers of the heart, called the atria, beat in a rapid and uncoordinated fashion, which can cause blood to pool within the heart. If blood clots form within the heart, they can break loose, travel to the brain and cause a stroke.

The researchers found that the people with AF had a greater number of rare gene variants in their potassium channel genes compared to a group of healthy volunteers. Studies of the importance of these genetic variants showed that in some cases, inheriting two or more variants along a gene might cancel each other out. In other cases, they may act in concert, causing serious abnormalities.

These type of studies offer the promise of personalised approaches to assessing people's risk of developing disease and responses to treatment.

The research team is now breeding zebrafish models as a way to assess the effects of these human gene mutations on heart function. Zebrafish are an important tool for researchers as about 70 per cent of human genes have a counterpart in zebrafish, including many disease genes.

“How does the heart pump and flow? How do our genes affect our heartbeat?”

VANDENBERG/HILL LABORATORIES

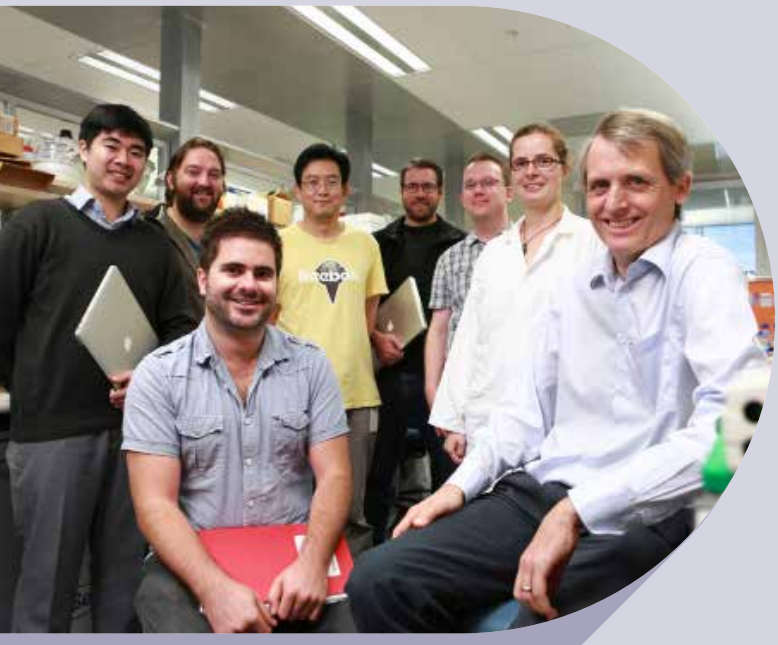
Arrhythmia, disturbance of the normal rhythm of the heart beat, is one of the most common causes of death in our community and represents a huge economic and social burden for individuals, their families and governments. For many patients at risk of sudden arrhythmic death, the only effective treatment option is an implantable defibrillator. These devices, however, are very expensive and have significant side effects. To determine whether the benefit of an implantable defibrillator outweighs the risks and potential complications, it is important to be able to accurately determine the risk of sudden death for any individual patient. Unfortunately however, at present it is still very difficult to predict the risk of sudden death.

The Cardiac Electrophysiology Laboratory, led by Institute Deputy Director, Professor Jamie Vandenberg and Group Leader, Dr Adam Hill, are currently using a range of molecular, electrical and computer modeling techniques to investigate the molecular mechanisms controlling electrical activation of the heart. They investigate how these molecular mechanisms may become disordered in patients who have inherited gene defects in the proteins that regulate the electrical activity of the heart. The group also investigates how defects in multiple ion channel genes and their interactions with the environment may combine to increase the risk of arrhythmias. The long term aim of their work is to improve the ability to predict risk of sudden death in patients with heart disease.

In collaboration with Associate Professor Diane Fatkin's Laboratory, in 2012 the group discovered that a mutation in a sodium ion channel gene was responsible for a risk of arrhythmias in a family who had been diagnosed with inherited cardiomyopathy and conduction disease.

They also developed a new computational analysis technique to investigate how defects in multiple ion channel genes can contribute to arrhythmia risk in patients with familial atrial fibrillation. The group has dubbed this new technique the "wheel of fortune" analysis, as the presentation of the analysis takes the form of a 'wheel' with hundreds of spokes that enable you to read off a "risk" score based on the different combinations of inputs.

During 2012, Dr Adam Hill established an independent "Computational Cardiology" research group within the Mark Cowley Lidwill Research Program on Cardiac Electrophysiology. Adam's group is using cutting-edge, high-performance computing to investigate the molecular basis of electrical signalling in the heart. In collaboration with the CSIRO, the group has used the "Bragg GPU Supercomputer" to undertake the first molecular analysis of the genesis of the T-wave, the electrical signature of cardiac repolarisation as recorded on a surface electrocardiogram.



GRAHAM LABORATORY

The key that switches the heart on

We have all experienced a pounding heart when we are angry or afraid. This is caused by the hormone adrenaline being released by the body, causing an 'adrenaline 'rush.' The adrenaline acts a key to unlock specific switches on the surface of the cell, known as the adrenergic receptors. This tells the heart cells to beat faster.

Executive Director, Professor Bob Graham's Laboratory studies the structure and function of adrenergic receptors, which 'catch' the adrenaline zooming around the blood stream and is then switched on, telling the cell to increase our heart beat.

Activation of these receptor switches during times of stress, the so called "fight or flight response" is critical for our survival. However, over-activation of these receptors can cause abnormal heart rhythms, high blood pressure and thickening of the heart muscle.

In 2012, the Graham group, in collaboration with a colleague in the United States, Professor Stephen Vatner, showed that one of these cell surface receptors in the heart protects against the effects of a lack of blood supply to the heart (as occurs in a heart attack) – a study reported in the *American Journal of Physiology*.

Rejuvenating old or damaged hearts

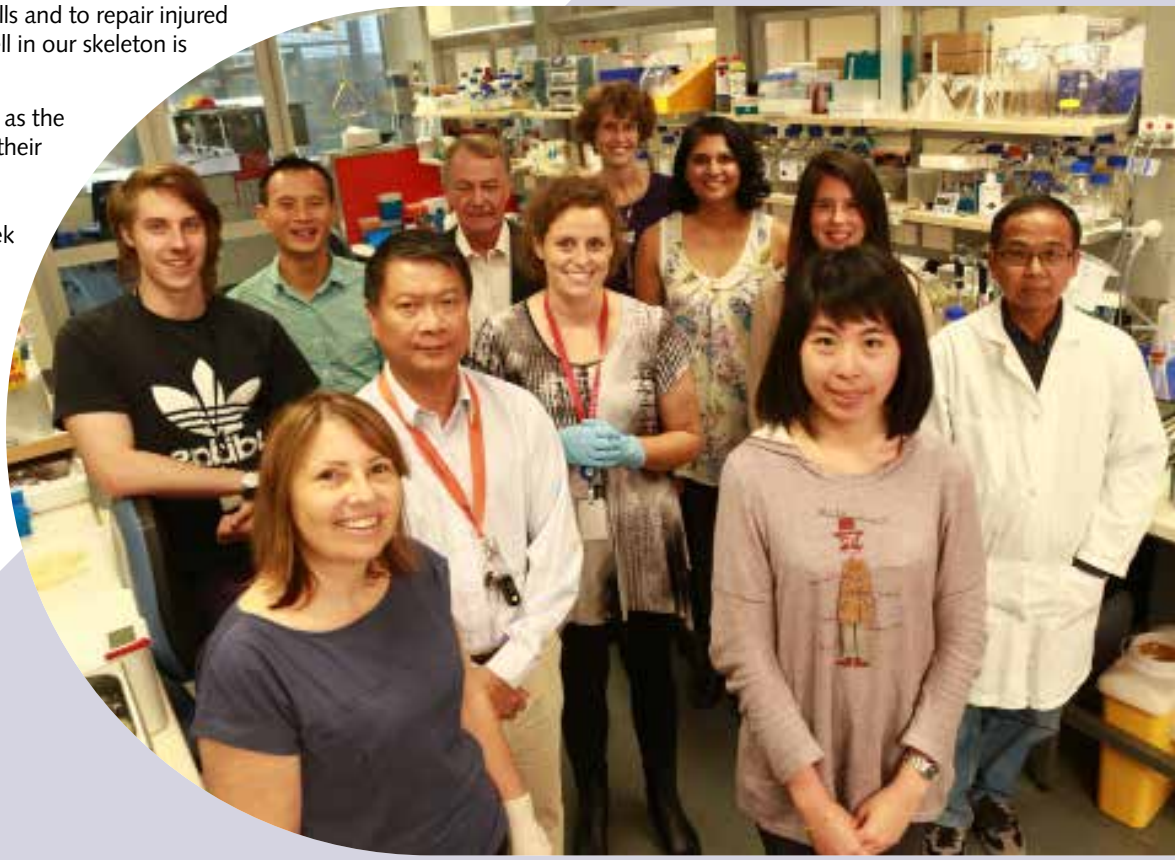
Some parts of our body, such as our skin and liver, are made up of cells that divide and reproduce throughout our lives, to both replenish worn out cells and to repair injured organs. For example, every cell in our skeleton is replaced every 7 years.

Other parts of our body, such as the heart and brain, lose most of their ability to keep growing or to regenerate. In the case of the heart, this occurs about a week after we are born.

Stem cells are 'mother cells' that have the ability to develop into any of the types of cells found in the body. Stem cells are responsible for generating new tissues, and for repair and regeneration of damaged and ageing tissues. Stem cells can be found in many parts of the body, including skin, liver and bone marrow.

Another major focus of the Graham Laboratory is the use of these bone marrow stem cells to try and make new blood vessels to supply the heart that has been deprived of a blood supply because of a heart attack, which is due to the blockage of a vital blood vessel supplying oxygen and nutrients to the heart muscle itself. In a study published in the international journal, *Heart* in 2012, the Graham Laboratory in collaboration with colleagues at St Vincent's Hospital, published research aimed at improving the heart's blood supply by using stem cells normally found in the bone marrow.

In additional studies performed in collaboration with colleagues in the United States (Professor Husain and Dr Nawazish Naqvi), the Graham Laboratory has identified a protein, the c-kit tyrosine kinase receptor, that is responsible for heart muscle cells losing their ability to regenerate after birth. Stopping this protein from working may allow our hearts to repair themselves properly after injury, in the same way that our livers can.



MARTINAC LABORATORY

Humans and animals are able to perceive vibrations when they hear something or something touches our skin. Even our heart cells can tell when something is touching them. When the heart is beating and pumping blood, its cells feel the motion and respond by sending an electrical current throughout the heart. This electrical current is made possible by a type of protein – called an ion channel – which pokes through the wall of the cell. An ion channel acts like a tap on a hose, opening to let ions flow through the cell wall, and closing to shut off the electrical current.

In bacteria these ion channels act as 'safety valves' protecting the bacteria from drastic changes in the salt concentration of its environment. The Martinac Laboratory study bacterial ion channels as they function in roughly the same way as human ion channels.

In 2012, the group published one article on such ion channels that react to pressure in bacteria, in the internationally prestigious *Proceedings of the National Academy of Sciences* USA. They found that the ion channels do not work as well if there is cholesterol present in the cell membrane. This has important implications for human heart disease.

The group will now continue this work in humans, by investigating how cholesterol and other fat molecules found in our cells affect the activity of mechanosensitive ion channel proteins and how this information can be used to create beneficial health and biomedical research outcomes.

The group has also secured funding from MAWA (Medical Advances Without Animals Trust) for a collaborative pilot project with scientists from the State University New York in the USA on mechanosensitive ion channels underlying sensations of touch and pain in humans and animals. In addition, Prof Martinac has secured a Principal Research Fellowship from the NH&MRC.

> **"Everything that living things do can be understood in terms of the jigglings and wigglings of atoms"**
>
> Richard Feynman

Science in the Spotlight

NEW ERA MEDICINE: REVERSAL OF AN ENTIRE FAMILY'S HEART RHYTHM DISORDER

In a world first in 2012, Victor Chang researchers led by Associate Professor Diane Fatkin and Professor Jamie Vandenberg, used gene-based therapy to successfully reverse an inherited heart rhythm disorder in members of an entire family, some of whom had previously been told they had only months to live.

This gene-therapy, practised as part of the new era of personalised medicine, achieved remarkable results. The findings were published in the *Journal of the American College of Cardiology* in October.

Rather than using conventional heart failure medicine, the researchers identified and treated the gene mutation that caused the family's heart rhythm disorder, dilated cardiomyopathy (DCM).

Dilated cardiomyopathy is a condition where the heart cannot pump enough blood to the body, making it a major risk factor for stroke and heart failure. Around 1 in 2000 Australians are affected by DCM.

Affected family members received a medicine shown in laboratory tests to target the gene mutation.

Associate Professor Diane Fatkin said the results were outstanding, with many patients with severe disease returning to full health within 6 months.

"This is game-changing research. Whilst we can only claim to have treated one particular mutation that causes cardiac dysfunction, and there is still much more to do to find the genetic causes of heart disease in every family, this is a huge step in the right direction."

Associate Professor Rajesh Subbiah, Clinical Faculty at the Victor Chang Institute, Co-Director of Cardiac Electrophysiology at St Vincent's Hospital in Sydney and co-author on the paper, says this is an example of integrated medicine and research at the cutting edge.

"We still have a long way to go for many families, but this research is an example of what can be achieved if we know the what, where and why about the underlying gene mutation. It's also a perfect example of research that extends from the bedside, to the bench, and back to the bedside – and how molecular research and clinical medicine can come together to unravel the cellular mechanisms of cardiac arrhythmias and cardiomyopathies."

The researchers in the Molecular Cardiology and Biophysics division are continuing their research using Next Generation Sequencing to try to understand what causes inherited heart conditions in other families.

"We still have a long way to go for many families, but this research is an example of what can be achieved if we know the what, where and why about the underlying gene mutation. It's also a perfect example of research that extends from the bedside, to the bench and back to the bedside."

Molecular Genetics Division

“Like lights on a Christmas tree, genes can be switched ‘on’ or ‘off’. How does this make you unique?”

SUTER LABORATORY

Each of us has a single unique genome – a set of instructions made of DNA that creates all the different tissues and cell types in our bodies. Epigenetic 'marks' sit on top of our DNA and dictate which genes are switched 'on' or 'off' in a given cell. This allows our DNA to generate the diversity of cell types we need from just a single set of instructions. Epigenetic marks are laid down in our cells as we develop in the womb, and sometimes the marks can be placed incorrectly, leading to important genes being switched on or off inappropriately. The Epigenetics Laboratory, led by Associate Professor Cath Suter, is interested in understanding how this incorrect setting occurs, and in particular, how a mother's diet during pregnancy can influence the setting of epigenetic marks that may in turn influence the health of her children, and even grandchildren or beyond, in their adult life.

In 2012, there were several major highlights for the Suter Laboratory, including publication of a significant research paper in the prestigious journal *Proceedings of the Royal Society* showing how alterations to maternal diet can cause progressive and cumulative epigenetic changes in offspring, when multiple generations of individuals are exposed to the dietary change. These cumulative, multigenerational epigenetic changes correspond to a reduction in diabetes risk in the population. The findings have implications not only for the impact of maternal diet on disease risk, but also for understanding evolutionary processes, so this study received international media attention.

The Laboratory also completed a study on the epigenetic consequences of gestational diabetes for offspring. The group found that maternal obesity and diabetes during pregnancy causes many alterations to epigenetic marks in offspring. They also found that offspring of obese mothers were more likely to develop metabolic disease later in life, particularly if they were exposed to a Western-style diet.

Inspired by the late Professor Paul Korner, the group also began using new technology to assess epigenetic marks in any species on a genome-wide scale, and are using this technology in a study on the epigenetic contribution to high blood pressure.

Individual achievements in the Laboratory included Associate Professor Cath Suter receiving a prestigious 'Future Fellowship' from the Australian Research Council, Dr Jennifer Cropley receiving an extremely competitive DECRA Fellowship from the Australian Research Council, and Cheryl Li being awarded her PhD from the University of New South Wales for her studies on the impact of maternal nutrition on epigenetics and disease risk in offspring.

Science in the Spotlight

GENE TWEAKING: COULD WE TURN OUR BIOLOGICAL DESTINY AROUND?

Victor Chang researchers propose a new understanding of evolution

Led by Associate Professor Cath Suter, a team of scientists in the Epigenetics Laboratory turned the widely accepted understanding of 'natural selection' on its head in 2012, with a paper published in Proceedings of the Royal Society B.

The team showed that desirable traits and characteristics, such as being lean and healthy, can become more common in a population over generations, without the need for a change to our genetic code, and that these changes can be reversed.

Epigenetics is an emerging area of research that looks at how genes are switched 'on' or 'off', often through an environmental change.

Using a mouse model, the researchers fed their subjects a diet rich in supplements such as folate, zinc and vitamin B12. The diet suppresses obesity in mice by turning a particular gene 'off'.

They found that when the diet was continued in the lean mice over five generations, these 'epigenetic' effects were inherited, and the proportion of lean and healthy mice in each subsequent generation increased, without any change to the genetic code of the mice.

Associate Professor Suter says the most compelling aspect of the findings is the reversible nature of the diet-induced epigenetic changes, unlike genetic changes which cannot be reversed.

"When we took the diet away from the mice, we found that the proportion of healthy and lean mice stayed the same for a generation or two, but then dropped off again," she says. "This kind of reversibility could be very advantageous if a change in environment was only temporary, say, a change in climate. Populations could adapt quickly but retain the ability to revert back if necessary.

"These findings could have implications for a number of other trends and changes in our population, such as the obesity epidemic that we're seeing all over the western world right now," added Associate Professor Suter.

Victor Chang researcher and co-author on the study, Dr Jennifer Cropley, says that we can no longer accept the idea that evolutionary changes only occur through genetics.

"Over the years we've come to accept that genetic changes underlie Darwin's theory of evolution and natural selection – that a chance genetic mutation occurs in a person, and if it's desirable or advantageous, it will be passed on through generations and eventually populations.

"What this study gives us is a new way of understanding how we might have evolved and how populations can rapidly adapt to new environments," said Dr Cropley. "This is an exciting first step towards testing the idea that epigenetics can drive evolution, not just in the laboratory, but in natural populations as well."

The research continues as part of a larger study into what the epigenetic effects of diet are and how it affects the future disease risk of offspring.

Figure 1:

These mice are genetically identical twin 'sisters', yet have different coat colours and are varying sizes due to 'epigenetic' changes. Researchers in the Epigenetics Laboratory have shown that desirable traits like being lean and healthy, shown in the brown mouse, can become more common in populations over generations without the need for a change in our genes.

“These findings could have implications for a number of other trends and changes in our population, such as the obesity epidemic that we’re seeing all over the western world right now.”

Structural and Computational Biology Division

STOCK LABORATORY

The Structural Biology Laboratory headed by Dr Daniela Stock uses X-ray crystallography and complementary biophysical and biochemical techniques to determine the structure of proteins and protein complexes at high resolution.

X-ray crystallography provides images of molecules that allow us to see the precise positions of the atoms within a protein or protein complex. Pioneered by the Australian Lawrence Bragg exactly 100 years ago, this technique revolutionised both material sciences and the life sciences and forms the basis of what we now call "molecular biology". It provides us with detailed blueprints of the nano-scale machines that populate cells and that keep us alive.

The Stock Laboratory is particularly interested in the structure of protein complexes involved in biological energy conversion. The way we convert food and oxygen into fuel for the body is via this protein machine, which at its heart, acts like a generator that works very much like the power generators in a hydroelectric power plant. Instead of water, this generator uses protons that drive the rotation of its turbine and instead of electricity it makes a small molecule called adenosine triphosphate, or ATP. ATP is the universal biological fuel that not only provides the energy for muscle movement driven by linear protein motors, but is used to drive virtually all biochemical reactions. Humans burn their own body weight in ATP every day – with the heart being the biggest energy consumer burning about 6 kg per day. ATP synthases are very complex molecular machines that are composed of very many parts and interact with many other cellular components in a highly controlled and precisely timed manner. ATP synthases are absolutely essential for survival and the wear and tear with ageing is one of the reasons we loose our energy with age.

The high-end goal of the laboratory is to obtain a molecular movie of an ATP synthase in action. In the past year, the group has obtained exciting high-resolution information of the peripheral stalk of an ATP synthase in different conformations, providing insights into its movements within the intact ATP synthase. The peripheral stalks form the push-rods of these tiny machines that connect distant valves and pistons. In combination with lower resolution images obtained from electron microscopy, the group has been able to construct the most complete and precise composite molecular movie of any ATP synthase to date.

> "Visualising molecular power generators at atomic resolution"

LEE LABORATORY

The human body is made up of hundreds of billions of cells. What happens inside our cells is responsible for the function of our tissues, organs and bodies in health and disease. Inside each cell there are tens of thousands of sophisticated biological machines that operate with efficiency and efficacy to keep our bodies functioning normally. The Molecular Motors Laboratory, led by Dr Lawrence Lee, seeks to understand how these machines look and function at an atomic scale. These dynamic pictures will provide a blueprint for the design of novel therapeutic agents that can manipulate these biological machines for the treatment of disease.

With a pedigree in structural biology, the Lee group uses well-established methods for visualising biological machines such as X-ray crystallography. In addition, they are establishing new techniques in single molecule biophysics in the Institute, such as single molecule fluorescence and optical traps. These new tools and expertise provide the opportunity to perform cutting-edge experiments available to few medical research institutions world-wide and hence their benefit will be shared by all groups in the Institute.

The group is also undertaking a fundamentally new approach to the study of the biological sciences at the molecular level; to study biological machines by building them from the bottom up. Using a very new tool, DNA self-assembly, the Lee group is building atomically precise 'nanoscale' structures to scaffold the assembly of one of nature's largest biological machines, the bacterial flagellar motor.

Their work on the atomic scale structure and function of biological machines resulted in four publications in 2012. These include one publication in Proceedings of the National Academy of Sciences, USA, that revealed how the machinery responsible for HIV infection, cleverly morphs its conformation to evade immune detection but can 'spring' into an active state to infect host cells. Another has been accepted for publication in the Journal of Biological Chemistry that potentially reveals an avenue for the design of a new generation of anti-inflammatory agents. This work also resulted in an international patent. In addition, the group published a review article that provides a new perspective on a heated international debate on the structure and function of the bacterial flagellar motor.

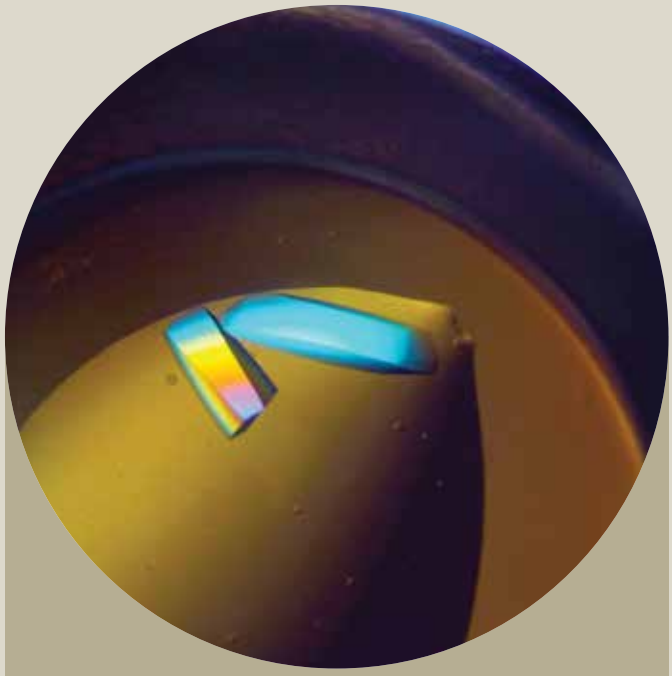


Image "Protein Crystals", courtesy of Dr Alastair Stewart, Stock Laboratory.

Using the experimental technique of X-Ray crystallography, where the crystals are exposed to a beam of high-energy light, this component of the protein complex ATP synthase was seen with a magnification of around 50,000 times that of the human eye.

> **"What I cannot create, I do not understand"**
>
> Richard Feynman

Science in the Spotlight

LAWRENCE LEE: A RISING STAR IN 2012

2012 was a landmark year for Dr Lawrence Lee. Having been at the Institute since 2007, working under the guidance of Dr Daniela Stock, 2012 was the year that saw Lawrence take the next big leap in his career.

Dr Lee established his own research group of five in 2012, in his first full year as Group Leader. He was not only awarded a fellowship from the European Molecular Biology Organisation (EMBO) to spend four months working on a special project at Oxford University, in 2012 every competitive research grant Lawrence led was successful. This resulted in a windfall of funding for new projects that are already making waves in the international scientific community.

All this before the age of 33.

The funding, largely from the Australian Research Council (ARC), the University of New South Wales (UNSW) and the prestigious Human Frontiers Science Program (HFSP) will allow Dr Lee's group to further their study of the structure and function of the bacterial flagellar motor (BFM) – the tiny motors in bacteria that allow them to swim rapidly towards nutrients and away from toxins, which is crucial to the spread of bacterial infection.

In an exciting world-first, their project aims to artificially build a functional 'switch complex' from the BFM, its molecular engine that is responsible for rotation and gear switching. This will allow the researchers to take the BFM '*in vitro*' for the first time. With full control of assembly, this will afford remarkable opportunities to address long-standing questions about the BFM and large, dynamic protein complexes in general.

The funding will also allow Dr Lee's group to build a custom, programmable fluorescence microscope, which forms part of his group's initiative to bolster the Institute's expertise in single molecule biophysics.

"We're taking a new approach to biological sciences with these projects by studying biological machines by artificially building them. The idea is to see the problem from a new perspective. In the end if you manage to build something from the ground up, you probably understand how it works," said Dr Lee.

Responsible for many of our most serious diseases, including bacterial endocarditis that destroys heart valves and rheumatic fever that causes inflammation of heart muscle, bacteria use their tiny propellers to move through bodily fluids to attack their target tissues.

Understanding the precise mechanisms that regulate their movements could have significant implications for the treatment of these potentially life-threatening diseases, by allowing the design of new anti-bacterial drugs to combat the spread of infection.

"Being in a new environment at Oxford during the year allowed us to expand our repertoire of the things we can do here, like building precise DNA nanostructures or custom fluorescence microscopes that are capable of performing tailored experiments that are not readily accessible in other medical research institutes worldwide" added Dr Lee. "Although we're adopting the approach of a physicist or engineer by constructing machines, this allows us to see biological questions in a completely different light, which I think is exciting."

Dr Lee leads an international consortium on these projects, encompassing world-leading research groups from the University of Oxford and Osaka University Japan. Whilst it's a busy life Dr Lee leads in the laboratory, he is also a mad-keen cyclist and a father of two young children.

“The idea is to see the problem from a new perspective. In the end if you manage to build something from the ground up, you probably understand how it works.”

PROFESSOR ROLAND STOCKER JOINS THE VICTOR CHANG INSTITUTE IN 2012

In December 2012, the Institute was fortunate to recruit one of the world's foremost Vascular Biologists, Professor Roland Stocker, to head up the new Vascular Biology Division.

Roland comes to the Institute with a wealth of experience and research success, having published over 250 publications, attracting 17,000 citations. Roland trained as a biochemist at the ETH Zürich in Switzerland, the Australian National University and the University of California, Berkeley USA. He has held appointments at the University of Berne in Switzerland, the Heart Research Institute Sydney, the University of New South Wales and the University of Sydney.

The Vascular Biology Program will bring a new dimension to the Institute's research – it aims to better understand the process called atherosclerosis, or the hardening of blood vessels. Atherosclerosis is the single biggest cause of heart attacks and stroke, and thus death, in Australia.

"I'm hugely excited to be bringing my team across to the Victor Chang Institute. The high calibre of research that's carried out in this organisation under Bob Graham's exceptional leadership, made it a very easy decision," said Roland of the appointment.

The new Vascular Biology Program officially starts in 2013, with a team of twelve researchers.

Awardees and Achievements 2012

Catherine Suter, Head of the Epigenetics Laboratory, was promoted to Associate Professor in the Faculty of Medicine, University of New South Wales. She was also awarded a very competitive Australian Research Council (ARC) Future Fellowship over four years.

Mirana Ramialison (Harvey Laboratory) was awarded a Career Development Fellowship from the National Health and Medical Research Council (NHMRC).

Co-Deputy Director of the Institute, **Professor Richard Harvey**, was a *Plenary Speaker* at the Keystone Symposium on "Cardiac Development and Regeneration" at Taos, New Mexico, in early 2012.

Nicola Smith (Graham Laboratory) was awarded a Young Investigator Prize for 2012 at the Lorne Conference on Protein Structure and Function.

Cheryl Li (Suter Laboratory) won Best Oral Presentation at the National Epigenetics Meeting.

DEGREES AWARDED

Four people were awarded PhD degrees in 2012 from the University of New South Wales (UNSW) including **Stanley Artap** (Dunwoodie and Harvey laboratories jointly), **Simon Keam** (Suter Laboratory), **Alastair Stewart** (Stock Laboratory) and **Ting Wai Yiu** (Graham Laboratory).

LIFE GOVERNORS AND AMBASSADORS

In 2012, we welcomed five new Ambassadors and one new Life Governor to the Institute, for their dedication, commitment and encouragement to our research. Their support has been unwavering, their loyalty unsurpassed. We thank them for years of support, advice and service to the organisation.

PATRONS

Mrs Ann Chang (2004)

The Hon. Neville Wran, AC, QC (2008)

PAST PATRON

The Late **Mr Kerry Packer**, AC (1994)

HONORARY LIFE GOVERNOR

Her Royal Highness Crown Princess Mary of Denmark (2005)

LIFE GOVERNORS

Mrs Barbara Ell (2000)

The late **Lady Finley** (2000)

Mr John David (2000)

Mr Frank Lowy, AC (2000)

Strathfield Car Radios (2000)

The Freshest Group (2000)

Abigroup (2000)

Freedman Foundation (2000)

National Australia Bank (2000)

Mr Robert Oatley (2001)

Mr Steven Lowy, AM (2001)

Telstra Corporation (2001)

Mrs Jennie Thomas, AM (2002)

Lady Mary Fairfax, AC,OBE (2003)

Mr Ziggy Switkowski (2003)

Mr Sam Chisholm (2003)

ANZ Bank (2004)

Citigroup (2005)

Mr James Packer (2005)

Mr Mark Johnson, AO (2006)

Mr Lance Rosenberg (2006)

Mr Ken Lee (2007)

The Atlantic Philanthropies (2007)

Mr and Mrs David and Diana Ritchie (2007)

John T Reid Charitable Trusts (2008)

Inghams Enterprises (2008)

Mrs Roslyn Packer, AO (2009)

Mr Lionel Lee (2010)

Mr and Mrs. Gerry and Wendy Commerford (2010)

Chain Reaction (2012)

AMBASSADORS

Mr John Laws, CBE (2001)

The late **Ms. Amana Finley** (2001)

Mr Ken Laing, AM (2001)

The late **Mr. Alan David** (2002)

Crane Group Limited (2002)

Steve Costi Seafoods (2003)

Crestbrook Mountain Springs (2003)

Baker and McKenzie (2004)

Schute Bell Badgery Lumby (2005)

Mr and Mrs. David and Diana Ritchie (2005)

Mr and Mrs. Scott and Rhonda Gibbons (2006)

Mr and Mrs. Russell and Julieanne Cooper (2007)

Mr and Mrs. John and Margaret Ingram (2007)

Mr and Mrs. Ralph and Lorraine Keyes (2008)

Guinness Peat Pty Ltd (2008)

Mr. Cameron Irving (2009)

Deutsche Bank (2009)

Club Marconi (2009)

LK Jewellery (2009)

Mr Steve Quinn (2011)

Cobram Estate (2011)

Ms Anne-Marie Allgrove (2011)

United Airlines (2011)

Virgin Airlines (2012)

Mr Terry McCabe (2012)

Mr Mark Ryan (2012)

HCF (2012)

Ms Michele Parker (2012)

Ms Emma Quick (2012)

"Discovery begins with individuals. Many of ours received accolades of the highest honour in 2012."

HONORARY LIFE MEMBERS

Ms Fiona Coote, AM (2001)
Mr Kerry James, AM (2004)
Mr John Kean, OAM (2010)
Mr John McGuigan (2010)

YOUNG AMBASSADOR

Mr Mark Vincent (2009)

2012 Awardees (from top): Mark Ryan, Shaun Larkin HCF, Terry McCabe, Danielle Keighery Virgin Airlines, Michele Parker and Emma Quick.

Paul Korner seminar series

2012 Paul Korner winner
Arash Sadrieh

The Paul Korner Seminar Series are presented weekly, providing our young scientists the opportunity to present an update of their research progress and achievements.

The Series was established in 1998 to recognise the outstanding contributions of Professor Paul Korner, a pioneer of cardiovascular research in Australia. Professor Korner sadly passed away in October 2012.

Jessica Chaston	*"Structural Investigation of the TF55 Chaperonin from Sulfolobus solfataricus"*
Scott Kesteven	*"Investigations into Postnatal Changes in Early Ventricular Diastolic Function"*
Peter Tan	*"Shining a light on new mechanisms of LQTS"*
Maryrose Constatine	*"A tale of two transient receptor potential channels: TRPM4 and TRPM7"*
Naisana Seyed Asli	*"Signaling Networks Regulating Adult Cardiac Stem Cells"*
Vesna Nikolova-Krstevski	*"The role of atrial endocardial endothelium in the development of atrial fibrillation"*
Reena Singh	*"Functional analysis of Nkx2-5 in cardiac development"*
Henrik Reinhard	*"Cardiovascular disease – risk reduction and repair."*
Chu Kong Liew	*"Taking a pitchfork to membrane proteins: A TALE OF TWO veloCITIES"*
Arie Jacoby	*"A non-coding locus for atrial fibrillation risk: exploring the regulatory jungle in a gene desert"*
Ying Ke	*"Biogenesis and assembly of hERG K+ channels:Implications for inherited long QT syndrome type 2"*
Arash Sadrieh	*"Cracking The Cardiac Code"*
Andy Ng	*"Untangling the slow deactivation of hERG: Structural and functional investigations"*
Gonzalo Del Monte Nieto	*"Molecular Dissection of Function/Form Feedback in Heart Morphogenesis"*
Alastair Stewart	*"Structural Investigations of the Peripheral Stalk of A-type ATPases"*
Alex James	*"Notch4 is an inhibitor of canonical Notch signalling"*
James Otton	*"Improving cardiovascular risk assessment with cardiac CT"*
Juliane Heide	*"hERG's split personality"*
Munira Xaymardan	*"The Role of Platelet Derived Growth Factor Receptor Alpha Cells in Response to Cardiac Injury"*
Ali McCorkindale	*"A story about Piwi: why a stem cell biologist should get excited about testicles"*
Arjun Iyer	*"Evaluation of DCD (donation after circulatory death) hearts as viable donors for heart transplantation"*
Gayathri Kumarasinghe	*"The answer lies in the solution: optimising cold storage of donor hearts"*
George Lukas	*"Are TRPC channels stretchable?"*
Kavitha Muthiah	*"Rise of the Machines, Patient-pump interaction in centrifugal continuous flow left ventricular assist devices"*
Poornima Balaji	*"Alpha 1A Adrenergic Receptors In Cardiac Repair and Regeneration"*
Sam El-Ajouz	*"Potassium Channel Gating at Molecular Resolution"*
Ming Li	*"Extreme physiological heart growth in preadolescence by intense cardiomyocyte replication"*
Robert Hynson	*"The Bacterial Flagellar Motor Artificially building nature's most sophisticated rotary motor"*
Matt Perry	*"Slowly solving the puzzle of fast gating in Kv11.1 channels"*
Nicola Smith	*"Finding an orphan a home: Studies of the orphan G protein-coupled receptor GPR37L1"*

WINNER:
Arash Sadrieh

RUNNER-UP:
James Otton

PEOPLE'S CHOICE:
Nicola Smith

Barbara Ell Seminar Series

This Seminar Series is named after Mrs Barbara Ell, a life governor, avid supporter of the Institute and a hard working member of both the Board and Appeals Committee.

The Institute invites a renowned Australian scientist to present a lecture as a part of the Barbara Ell Seminar Series.

Dr Margie Sunde	NHMRC RD Wright Research Fellow School of Molecular Bioscience, University of Sydney *"Using amyloid to your advantage – functional fibrils from fungal hydrophobin proteins"*
Professor David Thorburn	BSc(Hons) PhD FHGSA FFS(RCPA) NHMRC Principal Research Fellow Theme Director – Genetic Disorders, Murdoch Childrens Research Institute, Department of Paediatrics, University of Melbourne, Royal Children's Hospital *"New genes for mitochondrial disease and a mouse model of mitochondrial cardiomyopathy"*
Professor Bill Ballard	Head of School, School of Biotechnology and Biomolecular Sciences, University of New South Wales *"Genotype to phenotype: Mitochondria as a model"*
Dr Brett Collins	ARC Future Fellow, Institute for Molecular Bioscience, University of Queensland *"Structure-function Studies of Protein Trafficking and Membrane Remodelling"*
Associate Professor Peter Dearden	BSc, BSc (Hons), PhD, DIC Director of Genetics and Associate Professor, Biochemistry Department, University of Otago, New Zealand *"Mechanisms of Developmental Plasticity and Reproductive Constraint in the Honeybee"*
Professor Melissa Brown	Head, School of Chemistry and Molecular Biosciences, University of Queensland *Gene regulatory elements as breast cancer susceptibility loci and biomarkers*

WORLD-PIONEER ADDRESSES CARDIOVASCULAR COMMUNITY IN ANNUAL PRINCESSES' LECTURE SERIES.

The annual Victor Chang *Princesses'* Lecture, established in honour of the late Diana, Princess of Wales and HRH Crown Princess Mary of Denmark, was presented by Dr Richard T Lee, Professor of Medicine, Harvard Medical School and Harvard Stem Cell Institute, in October.

Over the last few years there has been a revolution in our understanding of stem cells and how they are used to repair tissue damaged both by disease as well as ageing. Dr Lee talked extensively on this subject, and specifically on the topic, 'Reversing Myocardial Ageing'.

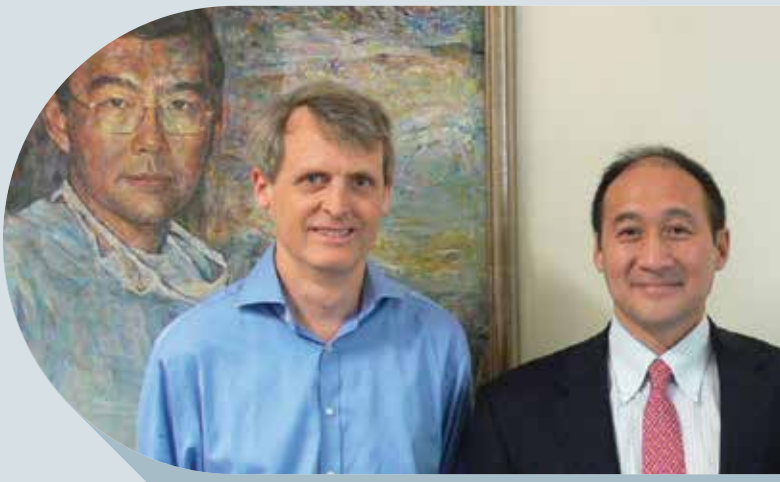
Dr Lee's training in both clinical medicine and biomedical engineering has enabled him to use a broad variety of techniques in genomics, imaging, nanotechnology, physiology, cell biology, and molecular biology to not only understand the fundamental mechanisms of myocardial ageing, but to develop novel therapeutic strategies to tackle these problems in the clinic. Dr Lee is a Fellow of the American College of Cardiology and heads the Cardiovascular Program of the Harvard Stem Cell Institute. He has also published over 180 peer-reviewed articles based on his research, which combines approaches in biotechnology and molecular biology to discover new avenues to manage and treat heart disease and diabetes.

It was a rare treat for the cardiovascular community to hear first hand from a pioneer and leader of this challenging but very exciting field.

Our thanks go to Roche, proud sponsor of the Princesses' Lecture 2012.

> "A rare treat"

Richard T Lee, 2012 Princesses' Lecturer, pictured with Deputy Director, Jamie Vandenberg



Publications 2012

"In 2012, only four Australian publications made it into the prestigious international journal Cell– we had two of these."

PRIMARY PAPERS

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LETTERS TO THE EDITOR

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CASE STUDY/ REPORT

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CLINICAL SPOTLIGHT

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Statement of Income and Expenditure

	2012	2011
	$	$
Income		
Grants	13,546,412	12,498,476
Fundraising	2,576,593	2,070,769
Bequest	1,586,377	1,237,926
Investment income	1,198,745	1,592,861
Other	68,968	107,114
Total Income	**18,977,095**	**17,507,146**
Operating Expenses		
Salaries and related expenses	11,603,611	11,234,299
Research consumables	1,812,570	1,822,198
Depreciation	2,003,352	2,036,709
Other operational expenses	933,595	977,341
Administration expenses	1,900,909	1,614,951
Fundraising expenses[1]	489,475	331,681
Total Expenses	**18,743,512**	**18,017,179**
Surplus/(Deficit) before non operating expenses	**233,583**	**(510,033)**
Non Operating expenses		
Unrealised gain/(loss) on investment revaluation to market	983,357	(825,991)
Net Surplus/(deficit) for the year	**1,216,940**	**(1,336,024)**

(1) Fundraising expenses are funded from investment income, so that 100% of donations are used for research

Fundraising Success in 2012

“To all of our wonderful friends and supporters, we say thank you – for your unwavering support, loyalty and generosity. This Institute would not exist without your continued support – our success over the past 18 years is due to your faith in our research.”

Left: ‘Paceline’ founder and Victor Chang Institute ambassador Steve Quinn is congratulated by the Hon. Tony Abbott, Leader of the Opposition, on the final day of cycling in November 2012. The Paceline crew of 30 riders cycled 1,100 km from Coolangatta to Sydney in 2012 to raise funds and awareness for the Institute’s research into cardiac arrhythmias.

CHAIN REACTION – THE ULTIMATE CORPORATE BIKE CHALLENGE

In 2007, Berrick Wilson, a Partner at Korda Mentha and National Head of Real Estate Advisory, founded Chain Reaction, a non-mass participation cycling event, as an act of gratitude for the care and attention his family received when Berrick's 2 year old daughter Milla was rushed to hospital with a brain haemorrhage. His experience over the weeks he and his wife spent at Monash Medical Centre made him realise that more could be done to help sick children.

Chain Reaction believes that individuals working together can make a real difference to the lives of sick children and the charities that support them. It invites individuals who want a physical challenge to participate in a gruelling 1000 km plus ride over 7 days. In return, participants benefit from valuable networking opportunities and the immense satisfaction of directly helping sick children.

It also challenges riders to use their standing in the business community to use their networks to raise a pre-determined minimum amount in personal donations.

Riders and support crew participate in the spirit of camaraderie, teamwork and fun with each event completed as a group and not as a race.

Since the first ride in 2007, Chain Reaction has raised in excess of $8.5 million. The ride is now staged in three states – Victoria, Queensland and Sydney in 2012.

John Ward, Chain Reaction's Executive Director and Chief Executive Officer is responsible for running its Victorian based ride and has managed its expansion into other states. Prior to joining the organisation, John spent 20 years in the funds management industry but his real passion not only stems from his interest in cycling but as the father of three children, it also allows him to give back to the community, through the charities the rides support.

Westfield Group Director of Corporate Affairs, Mark Ryan, is the Chairman of the NSW Chain Reaction ride with 'the voice of cycling' Phil Liggett its Patron. A keen cyclist, Mark rode in the Sydney to Melbourne event in 2011 and the inaugural 2012 Gold Coast to Sydney ride, which saw 30 cyclists make the 1,200km journey from Coolangatta to the Art Gallery of NSW in Sydney, taking in some of the most beautiful New South Wales scenery.

It was quite a challenge to ride almost 200kms every day, so when the peloton reached Sydney, the riders were tired but happy to be back in Sydney without incident and to be reunited with their families.

Through the generous support of corporate sponsors and personal donations, the 2012 inaugural NSW Chain Reaction Challenge raised over $700,000 for the Victor Chang Cardiac Research Institute. The funds raised will establish the Chain Reaction Bioinformatics Division and purchase an Optical Projection Tomography Microscope that will assist our research into the causes of congenital heart disease.

The Institute is indebted to Chain Reaction for its support and generosity.

PERTH FUNDRAISER

In 2012 James Packer, Steven Lowy and Ryan Stokes hosted a lunch at Rockpool, Birdswood Casino, Perth to introduce the work of the Victor Chang Cardiac Research Institute to some members of the Perth business community.

Each of the hosts spoke from the heart, sharing how their lives had been touched by heart disease and why the work at the Victor Chang Cardiac Research Institute was so important. Executive Director Professor Robert Graham also spoke and gave guests an insight into the type of research the Institute conducts.

The interest shown by those present was encouraging and their generosity outstanding. The Institute plans to name a research programme in Perth's honour. With no research facility in Western Australia dedicated to heart disease, the Institute hopes to build on the positive relationship established at the lunch.

DR VICTOR CHANG HONOURED BY AUSTRALIA POST AND MADAME TUSSAUDS

In 2012, the late Dr Victor Chang AC, was recognised by Australia Post with a commemorative stamp and medallion, released in April. The issue honoured five remarkable doctors who have contributed to making our health system one of the best in the world. The Institute would like to thank Australia Post for honouring the contribution these remarkable Australians have made to medicine.

Also in 2012, the world famous Madame Tussauds opened its 13th attraction in Sydney and chose Victor Chang to be one of the wax figures to be featured. Victor's image was painstakingly researched to ensure the tiniest detail was included.

The wax figure took twelve weeks to complete, being first modelled in clay by skilled sculptors. A mould was then made which was used to create the wax figure. Once this was complete the figure was coloured, clothed and hair inserted. The whole process created a work of art that is worth $250,000.




VICTOR CHANG 'HEART TO HEART' MASQUERADE BALL SPECIAL GUESTS

The Institute was honoured to have three very special guests attend its annual major fundraiser in 2012. All three suffered heart disease.

Jo Court, the wife of former WA Premier, the Hon Richard Court, AC suffered her first heart attack at the age of 45. Mrs Court had never smoked, had low cholesterol and blood pressure, was in a normal weight range and had no family history. She was shocked when a blood test confirmed that she had had a heart attack. It took her two years to recover and as a result of her not going to the doctor whilst suffering the symptoms, her heart suffered damage. Five years after her first attack Mrs Court and her damaged heart suffered a second massive attack and then a third ten days later while still in hospital. Since then she has made an amazing recovery.

Dual World Triathlon Champion Emma Carney raced her first triathlon in 1993, competed in her first International Triathlon at the World Championships in 1994 and won that race by the largest margin in the history of the sport. During 1995, '96, and '97 Emma won all but three races and took triathlon to a new level of speed, power and athleticism, coupled with feminine grace. Emma became a 2 time World Champion, 4 time world number 1 and 9 time Australian Champion.

In 2004, following a period of 6 years of poor performance, Emma was forced to retire when she was diagnosed with a serious heart condition. Emma was initially told by doctors she 'would never exercise again', as she was to be the recipient of an ICD (defibrillator). Since this time Emma has worked with her cardiologist and used heart rate monitoring to return to the level of fitness that allows her to continue an active lifestyle.

Twenty-year-old Ethan Warren's selection to the 2012 Olympic team was a feat against the odds. Midway through 2011 he was rushed to hospital and diagnosed with myocarditis, an inflammation of the heart caused by infection. He had 3.5 months off training and missed the 2011 World Championships.

But In 2012 Ethan had recovered enough to go back to competing and won a bronze medal at the London Test Event in the 3m springboard, took out the Rostock Grand Prix and Montreal Grand Prix against many of his Olympic rivals and won the Australian Nomination Trials in Adelaide which showed proof of his remarkable recovery. Ethan made the finals of the 3m springboard at the London Olympics and finished 7th in the final.

Above: Mr Steven Lowy, AM with Mrs Jo Court and the Hon. Richard Court, AC

INAUGURAL MONICA O'LOUGHLIN WOMEN AGAINST HEART DISEASE LUNCH

In February, the Institute launched its inaugural 'Women Against Heart Disease' Lunch in honour of our finance manager and friend the late Monica O'Loughlin.

Every day, heart disease kills around 30 Australian women. It kills four times more women than breast cancer yet alarmingly, it is a subject that women rarely discuss nor consider it to be a priority health issue. The aim of the lunch was to get the message through that women need to have regular heart check-ups, just as they do with mammograms and pap smears.

130 people attended the lunch, hosted by the Commonwealth Bank's Women in Focus Group and included representatives from Monica's family. A panel of very well-known and influential women including Her Excellency, Professor Marie Bashir, AC, CVO, Governor of New South Wales, leading heart surgeon Dr Emily Granger, Minister for Health the Hon Jillian Skinner and Australian Women's Weekly Editor Helen McCabe discussed the pertinent topic, 'Why do women put their health last'?

Each member answered a series of questions posed by emcee Sonia Kruger and spoke candidly about life as busy career women, juggling many different roles, stresses and family commitments just as Monica O'Loughlin had done.

"More than 90 per cent of Australian women have at least one modifiable risk factor for cardiovascular disease and half of all women have two or three, including high blood pressure, cholesterol, smoking diabetes and are overweight."

Above left: Australian Women's Weekly Editor, Helen McCabe.

Left: Former Institute Finance Manager and friend, Monica O'Loughlin.

The Victor Chang Awards for Excellence in Cardiovascular Journalism

60 MINUTES AND MARIE CLAIRE MAGAZINE TAKE OUT TOP GONGS AT 2012 MEDIA AWARDS

A story about an Olympic athlete's heartbreak after losing her baby to congenital heart disease, and a national multimedia campaign on women and heart disease took out top honours in the 2012 Victor Chang Awards for Excellence in Cardiovascular Journalism.

60 Minutes reporter Allison Langdon won the Metropolitan Award for her story "Broken Hearts" about winter Olympian and gold medallist Alisa Camplin's heartbreak after the loss of her baby Finnan, 10 days after he was born with severe congenital heart disease.

Professor Bob Graham, a member of the five-member judging panel, said the story was a stand-out winner for the Judges.

"Around 1 in 100 babies in Australia are born with some kind of heart defect. This is a massive issue that so many Australian families, just like Alisa and her husband, sadly have to face. We felt this story captured the raw emotion that comes with that struggle, and highlighted the fact heart disease doesn't discriminate – it strikes young and old."

Also taking home top honours at the Awards, presented at the Annual Victor Chang "Heart to Heart" Ball, was Marie-Claire Magazine, in the "Best Use of Media" category. Their multi-platform Red Dress Campaign 2011, was the biggest in its 9-year history, and included an 11-page magazine reportage, one episode of an 8-part documentary series, as well as digital media and additional fashion and PR events surrounding the initiative.

"The Best Use of Media was a new award introduced in 2012 to reflect a media landscape that is continually changing," said Professor Graham. "Marie-Claire know how to speak to women, and that is what this award is all about – the content across the entire campaign was engaging on so many different levels, and really brought home the important message about heart disease, and the fact it kills four times more women than breast cancer, to all Australian women."

The 2012 Regional Award went to Alan Erskine, Editor of the Mildura Weekly in Victoria. His story, "A Heart to Heart chat", reflected on a local resident's heart disease journey and the work of local support service 'Heartbeat'. The newspaper reaches an extensive area that embraces three states including Victoria, South Australia and NSW within a 300km radius of Mildura.

Australian News Channel CEO Angelos Frangopoulos, Walkley Award winning journalist Jill Margo, journalist Alan Kennedy and Deputy Director of the Victor Chang Institute, Professor Jamie Vandenberg made up the five-strong judging panel.

> **"The content across the entire campaign was engaging on so many different levels. It really brought home the important message about heart disease to all Australian women, and the fact it kills four times more women than breast cancer."**

Left to right: 2012 Media Award winners Alan Erskine (Mildura Weekly), Jackie Frank (Marie-Claire Magazine), Stephen Taylor (60 Minutes).

Victor Chang Health Check Booth 2012

KEEPING AUSTRALIAN HEARTS IN CHECK

2012 was a milestone year for the Victor Chang Health Check Booth. Clocking up nearly 6000 tests in organisations and communities around Australia, the booth travelled far and wide to check the heart-health risk factors of everyday Australians.

The Institute now has three booths with six registered nurses on call to perform blood pressure, blood cholesterol and blood glucose tests on participants – strong risk factors for developing heart disease, diabetes and stroke.

Of those tested in 2012, over a quarter (1506 or 26%) were recommended to visit their GP after recording abnormal or unusually high test results. The majority (around 19%) had high cholesterol levels.

In 2012, high cholesterol continued to be the largest risk factor and was more than double the number of people who presented with either high blood pressure or high blood sugar. Alarmingly, 49 per cent of participants did not know what their cholesterol levels were.

Health Check Booth Manager, Ms Jayne Baric, says the Booth's popularity continued to go from strength the strength in 2012, getting out to more and more communities in both metropolitan and regional Australia.

"These are simple tests, but they are tests that are helping save lives all over Australia. The beauty of this initiative is we're getting people to start thinking about their hearts – many heart attacks can be prevented by modifying and monitoring the right risk factors."

"It's estimated that for every 100,000 blood pressure tests conducted in the community, 191 strokes are prevented, and countless other heart attacks. We want more Australians to enjoy this service, so that more lives can be saved," added Ms Baric.

Special thanks in 2012 go to Health Check Booth major partners HCF, IMB Community Foundation, Kia Motors and PricewaterhouseCoopers.

To book the Victor Chang Health Check Booth for your next corporate or public event, please contact Jayne Baric on (02) 9295 8760 or j.baric@victorchang.edu.au.

THE BOOTH BY NUMBERS IN 2012

102
Testing days across Australia

4
States and many NSW regional locations visited

5769
Individual tests carried out

56
Average number of people tested per day

142
Record number of individuals tested in one day (HCF Brookvale)

1506
Or **26%** had one or more results outside of ideal range, recommended to visit GP

403
Or **7%** of participants had high blood pressure

2861
Participants did not know their cholesterol levels

1095
Or **19%** had high cholesterol

394
Had high glucose/ blood sugar levels

> **These are simple tests, but they are tests that are helping to save lives all over Australia.**

Victor Chang School Science Awards

SARAH'S SCHOOL SCIENCE AWARD WIN INSPIRES A HOPEFUL CAREER IN CARDIOLOGY

Sarah Coss has always had a keen interest in science. But it wasn't until a laboratory experiment in year 9 biology that she developed a keen interest specifically in the world of heart disease and cardiac research.

"I was actually doing an experiment on a lamb's heart, and straight away I knew that's what I was interested in and potentially what I wanted to do," recalls Sarah.

It's somewhat serendipitous that Sarah was awarded the Victor Chang School Science Award in 2012. Her teachers at Magdalene Catholic High School nominated her for consistently producing outstanding results in all assessment tasks.

"My ultimate goal is to be a cardiac surgeon one day, which makes this award that much more exciting for me. I was so nervous before today but I am so honoured to receive this award from this organisation that does such incredible work in this area," added Sarah.

Sarah is studying biology and chemistry, as well as PDHPE, which has further extended her interest in cardiovascular disease as a public health issue.

She received her award with 71 other students in the South-West Sydney Region, all nominated by their schools for their outstanding achievement in scientific studies throughout the year.

Professor Jamie Vandenberg, Institute Deputy Director, spoke to the students on the day, as did 2006 Award recipient Gary Neidermayer, who is now doing his PhD in dementia research at the University of Western Sydney.

"This award was the catalyst for me to choosing a career in science," said Garry.

Over 200 year 11 students from 200 New South Wales schools were presented with this accolade in 2012. Since its inception in 2003, the Victor Chang School Science Award has been received by over 800 students.

Above: Sarah Coss (centre) pictured with Professor Jamie Vandenberg and Mrs Ann Chang at the Sydney South-West award ceremony at the University of Western Sydney.

HOW ARE WE FUNDED?

Approximately **70%** of Victor Chang funding comes from competitive research grants, from funding bodies such as the National Health and Medical Research Council (NHMRC) and the Australian Research Council (ARC). This funding is not guaranteed, and our scientists must work hard to secure grants on an ongoing basis, competing against other organisations and university researchers around Australia. The rest of our funding comes from other means of financial support, including money raised from our own fundraising initiatives, bequests and donations from the general public. Of the money that is generated through fundraising activities, **100%** of every dollar donated each year goes into supporting our researchers.

LEAVING A LEGACY: A BEQUEST TO THE VICTOR CHANG INSTITUTE COULD SAVE A LIFE

Recently the Victor Chang Cardiac Research Institute received the entire proceeds of an estate from someone who had only ever given a small donation to the Institute.

This bequest was a very important contribution to the substantial funding required to continue our important research into the prevention, diagnosis and treatment of heart muscle diseases.

Today, bequests are becoming a more important source of funding. However small or generous a bequest may be, you can be confident that it will assist in our quest to solve the mystery of heart muscle disease.

In the instance mentioned above, the Institute was unaware of this bequest until it was received.

As well as being able to acknowledge such generosity, we would also like potential donors to get to know the Institute and meet the scientists so they can see and be part of the important work being done to build a healthy heart to ensure that generations to come will be able to live in a world free of heart disease.

This is why we have formed the Victor Chang Bequest Club – **YOUNG@HEART**. By becoming a member you are allowing us to get to know you and will be invited to attend a special bi-annual Institute tour and lunch. We hope you will consider becoming a member to learn how your Gift could help save a life.

Corporate Supporters

Our thanks go to the following organisations who continue to support our work each year.

You too can help us in our fight against heart disease. Support the Victor Chang Institute by calling 1300 VICTOR (842867), or visit www.victorchang.edu.au







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