



heart TO HEART

THE BAIRD
INSTITUTE
Applied heart & lung surgical research

NOVEMBER 2025

FIRST CARDIOTHORACIC TEAM AT ROYAL PRINCE ALFRED HOSPITAL

A Glimpse into History

This rare photo shows one of the earliest cardiorthoracic surgical teams at Royal Prince Alfred Hospital, believed to be taken in the mid-1950s. The dedication and innovation of these early teams laid the foundation for modern heart and lung surgery in Australia.



Surgeons in the photo: Dr Sandy Grant (far right - back), Dr Rowan Nicks (3rd from left), Dr Frank Mills (3rd from right), Dr Hank Bahnson (far right leaning forward – front).



A MESSAGE FROM OUR PATRON

**The Hon. Michael Kirby
AC CMG**

In this issue of The Baird Institute newsletter, we share a rare photograph of one of the first cardiothoracic surgical teams, established at Royal Prince Alfred Hospital in the 1950s. This is a reminder of how far heart and lung surgery have come in Australia since those early days.

There is also an inspiring story of patient, Geoff Hatfield. He shares his journey through major heart surgery, stroke and recovery. His resilience reminds us of why continued research and support are so vital for the mission of The Baird Institute.

Post Doctoral Fellow, Dr Robert Hume, has presented findings in Japan following his research. This showed that the heart's ability to regenerate after a heart attack suggests exciting steps that can be taken towards treatment that promotes better heart recovery.

A first of its kind study on mechanical heart support chronicles the three advanced technologies (VA-ECMO, Impella, ECPELLA) that offer new insights into the treatment of cardiogenic shock. The results of this research were published in Nature Scientific Reports. At the same time in another scientific journal, Aging Cell, recognition was given to Post Doctoral Fellow, Dr Cassandra Malecheki's activities in uncovering how hearts and aortas change with age. This research has been recognised nationally and is important for a large cohort of aging patients who undergo heart and lung surgery.

The Baird-supported scholars who are pushing the boundaries of what is possible by studying synthetic artery grafts, identified biomarkers that detect aortic aneurysms earlier. Similarly, as a young researcher surgeon who pushed the boundaries in his time, Professor Douglas Baird, our Founder. A data driven project at The Baird Institute is analysing outcomes for patients, five years after undergoing coronary bypass surgery. The aim of the study is to improve patient care well after the operative procedure is concluded.

Finally, patient-focused education has always been a major theme for the Institute. From webinars and individual engagement to collaboration with international experts, the Baird Institute is empowering patients and families to better understand heart and aortic disease and the increasing range of treatment options.

Through cutting edge research and technology at the bedside of patients, The Baird Institute is one of the great medical research centres of Australia and its region. Scientists and technologists produce the ideas. Patients, families and good citizens afford the essential donations to fund this heroic work.

Patron, The Baird Institute



FROM THE CEO'S DESK

As we approach the end of another remarkable year, I'm reminded how powerfully history and innovation intertwine at The Baird Institute. In this edition, we reflect on the extraordinary journey of heart and lung surgery in Australia from the pioneering team at Royal Prince Alfred Hospital in the 1950s to the world-leading research our Institute proudly supports today.

The photo featured on our front page is more than a glimpse into the past; it's a reminder that progress depends on courage, curiosity, and collaboration - qualities that continue to define our community. The story of patient Geoff Hatfield, who has faced and overcome immense challenges with strength and optimism, embodies why we do what we do. Every study, trial, and surgical innovation we undertake ultimately serves people like Geoff, who trust us to push the boundaries of what is possible.

Our researchers continue to make global impact. Dr Robert Hume's presentations in Japan showcased new understanding of heart regeneration, while Dr Cassandra Malecheki's internationally recognised work on how the heart and aorta change with age provides vital insights for the growing number of older patients undergoing surgery. Studies published in the Nature Scientific Reports and Aging Cell reaffirm that our research is not only world-class but life changing.

We also highlight our ongoing projects in mechanical heart support, long-term cardiac outcomes, and advanced artery replacement, each demonstrating how far we've come since those early surgical pioneers and how much further we can go with your support.

As the festive season approaches, I want to express my heartfelt thanks to our donors, collaborators, and friends. Your belief in our mission continues to power our progress and give patients renewed hope. Together, we are not only saving lives, we are shaping the future of cardiac and thoracic care in Australia and beyond.

Warm regards

**Catherine Rush
CEO, The Baird Institute**



A PATIENT STORY

Geoff Hatfield

I've spent most of my life working in the marine field, half my time on the tools and the other half on the drawing board. I've always considered myself reasonably fit. I played soccer for 40 years, and for 50 years I've been a proud member of the RFS, with 40 of those years spent fighting fires.

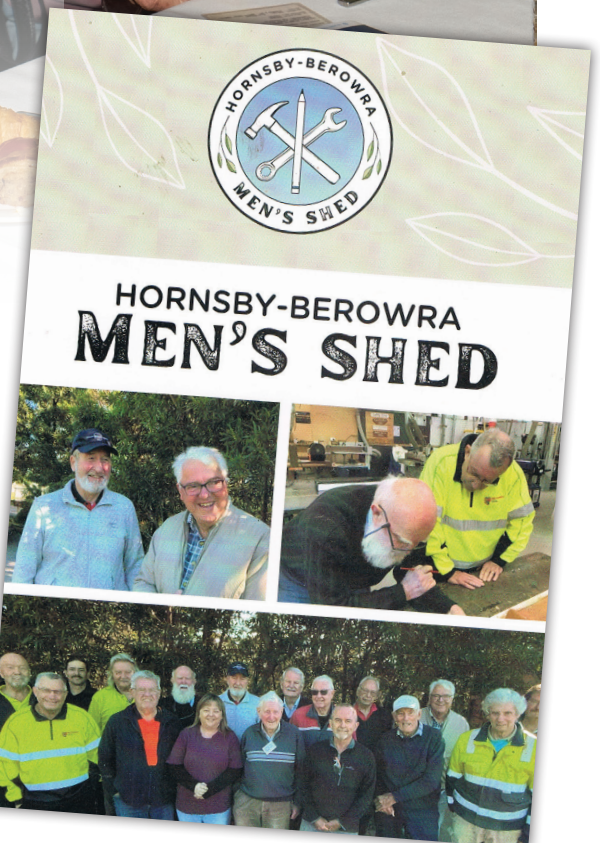
Back in January 2007, while I was living and working at Yamba, I went to the local GP about a cut on my finger. It was nothing major, it didn't even need stitches. But while I was there, I mentioned that a couple of times when I got up in the morning, I felt like I'd just run a marathon or played a hard game of soccer. The GP sent me to a cardiologist, who started with some preliminary tests. Then he looked at me and said, "We won't be doing the stress test after all. Don't lift anything heavy - in fact, don't lift anything at all. You need a heart operation."

Within two weeks, I was at RPAH having tests, and then on 6 February 2007, I had a 10-hour operation with surgeon Nic Hendel. I ended up having my aorta, aortic arch, and aortic valve replaced. The aneurysm they found was large. Just two weeks after that operation, I collapsed in the bathroom and was momentarily knocked unconscious. I was taken

to Hornsby Hospital and then transferred back to RPAH, where I was diagnosed with atrial fibrillation. Thankfully, it corrected itself and hasn't returned. Rehabilitation after surgery kept me busy with lots of exercises. At first, I thought about the operation a lot, but these days I don't dwell on it. I just try to eat well, take things easy, and keep going.

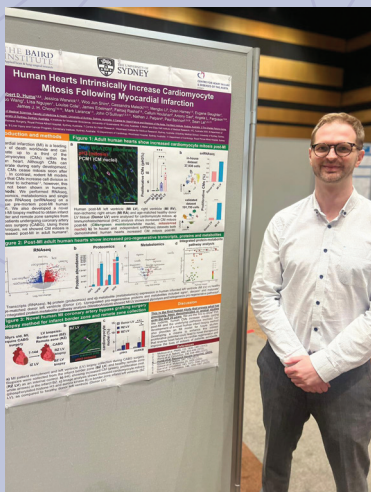
"We won't be doing the stress test after all. Don't lift anything heavy - in fact, don't lift anything at all. You need a heart operation."

Life went on, and I eventually returned to light work in Newcastle. But in November 2011, I felt an unusual discomfort in my chest one evening and decided to admit myself to John Hunter Hospital. It turned out I was having a cerebellar stroke.



Looking back, I was lucky, the stroke happened while I was already in hospital. Rehab this time wasn't just the usual physical work; I also had to relearn how to speak and do extra coordination exercises, like writing.

These days, I make sure I have regular check-ups with my GP, my cardiologist, and a neurologist who monitors me for epilepsy and possibly early Parkinson's disease. I share my story in the hope it helps others who might face similar challenges. **The Baird Institute** does incredible work in this space, and if sharing my experience adds to that, then I'm glad.



RESEARCH PRESENTATIONS

Dr Robert Hume – Post Doctoral Fellow, The Baird Institute

I recently attended the *International Society for Heart Research (ISHR)* 25th world congress, in Nara, Japan. This prestigious 4-day conference occurs every 3 years and brings together the world's top heart researchers from every continent. **The Baird Institute's** kind support to attend this event enabled me to present my groundbreaking findings on the heart's ability to partially regenerate following a heart attack during a scientific poster presentation session (see image). It also enabled me to forge potential new collaborations with scientists hailing from across the globe. These international collaborations are integral for bringing together experts from different fields, to produce the highest calibre of research impact. I was also able to attend talks from leaders in the field presenting their current unpublished data at the forefront of cardiovascular research. This not only informed me of the current state of this research area but also provided a wealth of ideas to progress and enhance my own research program. I am incredibly grateful for this opportunity from **The Baird Institute** and also for the donors who make this happen.

Recently, I was invited to speak at the cardiovascular initiative (CVI) *Research Symposium – Pipelines to Success: Empowering the Next Wave of Cardiovascular Innovators at the University of Sydney*. I was very honoured to have been invited to this event and chose to present our latest findings relating to my other research topic – blood vessel regeneration. Specifically, I presented our exciting new synthetic blood vessel graft, to replace damaged blood vessels, that has shown promise in laboratory experiments, outperforming the currently used clinical gold standard material, polytetrafluorethylene (aka Goretex). At this event, I contributed to a panel discussion with other cardiovascular research leaders to discuss the future of the field.



RESEARCH PROJECTS

Dr Cassandra Malecki – Post-Doctoral Fellow – The Baird Institute

As a post-doctoral fellow at **The Baird Institute**, I have been extremely fortunate to contribute to important and exciting research over the past 18 months. I have an interest in trying to understand how our heart and vessels change as we age. We know that age is one of the biggest risk factors for developing cardiovascular disease and therefore understanding the changes that occur at a molecular level will assist in the development of preventative and therapeutic options for age related cardiovascular disease such as heart failure and atherosclerosis.

Our comprehensive study comparing proteins, metabolites, lipids and thousands of genes between younger and older hearts was recently accepted for publication in *Aging Cell*, a leading journal in the aging field. This was an extremely exciting achievement, as this is the first study to characterise the molecular patterns of normal human cardiac aging. We hope that our paper and data will serve as an essential resource for all those with an invested interest in unravelling the complex landscape of human cardiac aging.

This paper on human cardiac aging was submitted to the *Cardiac Society of Australia and New Zealand (CSANZ)* for consideration of the Ralph reader prize, a prestigious prize for early career researchers given at their Annual scientific conference. I was chosen as *one of the three finalists* and was honoured to be able to present my research at the conference. The presentation received an immense amount of positive feedback, sparking many insightful and scientifically rich conversations.

Currently, I am now working on a project investigating how the aorta, our largest blood vessel, changes as we age. We have looked at the expression of thousands of proteins in healthy aortas from people ranging from 10 to 65 years old and have analysed how they change with age. We have seen that several key proteins important for the strength and structure of the aortic wall decrease as we age. I am currently writing up the study to submit for publication and working on designing experiments to further characterise the changes in these proteins.

In addition to my research in cardiovascular aging, I also have a role in managing the **Sydney Heart Bank**, an essential resource of human cardiovascular tissue, which has been pivotal in numerous research projects being conducted by our research lab. I have been involved in helping with multiple projects and over the past 18 months several of these studies have been published in highly respected scientific journals. This highlights the importance of utilising the tissue of the Sydney Heart Bank in well-designed studies to further our understanding of cardiovascular disease.

I am extremely grateful for the continuing generosity of the supporters of the Baird Institute; whom without, this exciting research would not be possible.

INVESTIGATING THE LONG-TERM OUTCOMES AFTER CARDIAC SURGERY

Dhairya Vayada, Data Research Assistant

The Baird Institute team is working on investigating the long-term outcomes after cardiac surgery. This is a data intensive project, linking our internal hospital database with a larger database of all hospitalisations, emergency presentations and mortalities in NSW. The broad goal of this project is to understand what happens to patients in the long term (>5 years) after cardiac surgery.

As a part of this project, we are investigating the long-term outcomes after coronary artery bypass graft (CABG) surgery. CABG surgery is one of the most frequently performed cardiac surgeries worldwide and is a cornerstone in the management of coronary artery disease. In this procedure, blockages in patient's coronary arteries – arteries which supply blood to the heart, are bypassed using veins or arteries from other parts of the body. This bypass restores blood flow to the heart, restoring the function, viability of the muscle and providing symptomatic relief from chest pain. There are two main types of CABG performed – 'on-pump', where a cardiopulmonary bypass circuit is used to circulate blood and the patient's heart is stopped, and 'off-pump', where the procedure is conducted on a beating heart. Furthermore, this procedure can be done as an isolated procedure, or in combination with valve surgery.

While these are routinely performed surgeries, analysis of the long-term data will help in developing an understanding of the clinical course and improve survival outcomes and quality of life for the patients.

In this project, patients who have undergone an isolated CABG procedure in the hospital database will be identified. After linkage with the broader NSW database, information about each patient's hospitalisations, emergency presentations and mortality will be collected. Demographic information about each CABG group (on-pump and off-pump) will be obtained and compared. Survival analysis will then be conducted to explore survival trends >5 years after the surgery. Importantly, leading causes of cardiac-related re-hospitalisations and re-interventions will also be analysed, providing valuable information on the clinical course and major risks for these patients after surgery.

The results will shortly be published in a peer-reviewed journal and presented as a poster at the 2025 Tri-Society Cardiac & Thoracic Symposium (3SCTS).



Impella - Left Ventricular Assist Device

V-A ECMO vs IMPELLA vs ECPPELLA: A HEAD-TO-HEAD COMPARISON OF PHYSIOLOGY

Professor Konstantin Yastrebov

When the heart suddenly stops working properly and medicines are no longer effective, the body can't get enough blood and oxygen. This serious condition is called cardiogenic shock. It can happen after a major heart attack, sometimes after big heart operations, or after severe inflammation of the heart muscle often due to viral infections. In the most extreme cases, survival may depend on using **mechanical circulatory support (MCS)** to keep the blood flowing.

There are several modern types of MCS, including veno-arterial extracorporeal membrane oxygenation (VA-ECMO), temporary left ventricular assist devices (LVADs), or a combination of both. VA-ECMO uses two large tubes, one placed in a vein to remove blood and one in an artery to return it after passing through a machine that adds oxygen. One type of temporary LVAD is called an "Impella", which is a tiny pump on a tube that goes into the heart's main pumping chamber and pushes blood into the body. Sometimes both VA-ECMO and Impella are used together, in what's known as ECPPELLA.

Even though these technologies have been used in hospitals for years, there's still a lot we don't know, like how exactly the body responds to them, when to use them, the best settings to use, and which patients will benefit the most. It's also difficult to fully understand how a healthy heart responds to MCS, which makes it harder to predict what will happen in people with different heart conditions or when they're recovering.

A recent investigation supported by **The Baird Institute** and completed at the **University of Sydney** was the first of its kind to compare the effects of three different MCS techniques used in different ways. The study looked at how the heart and blood circulation responded, and how much oxygen the heart muscle needed, under different support settings.

This complex study involved a highly skilled team including heart surgeons, intensive care doctors, cardiologists, scientists, anaesthetists, perfusionists, and data experts. The findings showed that all three MCS methods helped reduce the strain on the heart and lowered how much oxygen it needed. Importantly, using two devices together (ECPPELLA) may be the best option for patients in very severe shock.

The study has opened up new directions for future research into how best to use these devices especially for people with weakened hearts. More studies are already underway as part of a larger research program into mechanical heart support. The results were published in the well-regarded journal Nature Scientific Reports.

WEBINARS

TAKING CARE OF YOUR AORTA – 8 May 2025

Dr Michelle Lim

We were pleased to work with the GenTAC Alliance in the USA to host a webinar on 8 May, 2025 for patients and families affected by aortic disease. The GenTAC Alliance and The Baird Institute share common goals, prioritising research and patient and physician education on genetic aortic and vascular conditions. The webinar was co-hosted by Professor Alan C. Braverman, a world-leading aortic clinician and researcher from Washington University in the USA.

Joining the panel were two highly respected Australian aortic specialists: aortic cardiologist Professor Richmond Jeremy, and Professor Paul Bannon, aortic cardiothoracic surgeon and Chair of The Baird Institute.

The webinar covered various aspects of aortic care, including the genetic basis of aortic disease, surgical therapies, and the importance of having a dedicated team of aortic specialists working together. A wide range of conditions were discussed, including Marfan syndrome, Loeys-Dietz syndrome, and other genetic aortic disorders, as well as aortic aneurysm and dissection.

Through this webinar, we aimed to educate and support aortic patients across Australia and New Zealand, while also raising awareness of aortic conditions among healthcare providers and the broader community. We hope to hold further webinars like this one in the future.

WEBINAR

Taking Care of Your Aorta

An Update for Aussie and Kiwi Patients and Families

Thursday, May 8, 2025
5:30–6:30 pm AEST



Alan Braverman, MD



Paul Bannon, MBBS,
PhD, FRACS



Michelle Lim, MBBS,
PhD, FRACP



Richmond Jeremy,
MBBS, PhD, FRACP



CUTTING EDGE ARTERY REPLACEMENTS – 25 August 2025

Dr Robert Hume, Prof Paul Bannon

In this webinar, held on 25 August 2025, Dr Hume and Professor Bannon provided an update on their ongoing research at the *Centre for Heart Failure and Diseases of the Aorta* into cutting-edge artery replacements. Thanks to the generosity of our supporters, we have been able to take significant steps forward in this research, initiating advanced imaging studies, including CT 2D and 3D angiograms, as well as critical ultrasound-based experiments, all essential tools for assessing how our degradable artery grafts are performing.

The team has also diligently been preparing tissue samples for microscope analysis, helping us gain deeper insights into the cellular structure of the grafts. At the same time, we are continuing to work on new designs of the synthetic artery with each version aiming to improve on the last, as we refine their structure and performance.

BAIRD INSTITUTE WEBINARS



CATCH UP ON OUR WEBINARS AT ANY TIME

At The Baird Institute, we're committed to keeping our supporters informed and engaged through our online webinars. These sessions are a fantastic opportunity to hear from experts, learn more about the latest developments in heart and lung research, and to get an insider's view of the important work we're doing.

If you've ever missed a webinar or simply want to revisit one of our past sessions, don't worry – you can watch them at your own convenience! All of our webinars are recorded and available for viewing at any time. Simply visit our webpage at - bairdinstitute.org.au/webinars

SCHOLARSHIP & GRANTS PROGRAM



Wade Boeking
PhD Student

Over the past four months, I have been actively engaged in preparing the foundations for my PhD work, particularly spending time consolidating and expanding my knowledge of vascular regeneration. During this exploration into the literature surrounding vascular regeneration, I have been collaborating with other members of the lab, under the direction of Dr Rob Hume, to prepare manuscripts for future publication.

In regard to activities in the lab, I have been learning new techniques, such as histology (processing vessel tissue) and microscopy, which will underpin my work over the course of the project. With these techniques, I have been steadily processing over 100 samples from the vascular graft study undertaken in sheep, and I hope to have a number of exciting results in the coming weeks. Additionally, I performed mechanical testing on samples related to this project and have subsequently learnt how to analyse this data. Along with this, I have been trialling the Lunaphore COMET, a cutting-edge tool designed to produce images which can give users detailed insights into cell types/interactions and how this may relate to vessel regrowth. While this is still in its early stages, we have already been able to see its potential for future use.

The near future will be fruitful, as I have planned to finish preliminary work on the sheep artery replacement samples, as well as looking more closely at their protein profiles to assess the effectiveness of graft remodelling. Alongside this, the group are also aiming to begin the next phase of our project which involves testing the refined version of the vascular graft.

I would like to take a moment to thank the The Baird Institute and its supporters for this opportunity.



Matthew Taper
PhD Student

I've recently been working on a number of projects that build on Dr Cassandra Malecki's study of ageing. With assistance from the team and collaborators from Monash University, we have completed a study measuring DNA methylation (a biomarker closely linked to ageing) in heart samples across healthy ageing. This will be the largest study of its kind to date, and we are currently analysing the results in preparation for publication.

I also recently completed a comparative study of ageing in the two main pumping chambers of the heart - the left and right ventricles - at the protein level. Preliminary results have revealed several interesting findings with potential clinical implications, particularly since many medications effective in left-sided heart failure have little to no effect on conditions affecting the right side.

To further explore these differences between the ventricles, we've started using advanced techniques that allow us to examine not only the properties of individual heart cells, but also how their surrounding environment (the types of neighbouring cells they interact with) changes over time during ageing. This helps us better understand how shifts in cellular interactions might contribute to overall heart function with age.



Briet Stefánsdóttir
Medical Student

My name is Briet Stefansdottir, and I am a medical student at the University of Copenhagen. Originally from Iceland, I moved to Denmark in 2020 to begin my medical studies. I completed my Bachelor of Science there and am now pursuing my Master of Science, which I expect to finish in 2026.

Alongside my studies, I have been involved in cardiology research, focusing on cardiovascular function and metabolic profile in adolescents born after assisted reproductive technologies. I am also a board member of the Surgical Society for medical students in Copenhagen.

I have decided to specialise in cardiothoracic surgery. I always knew I wanted to become a surgeon, but after seeing my first open-heart surgery, there was no turning back.

In our final year of medical school, we write a master's thesis in the field we want to pursue. I am truly honoured to be supervised by Professor Paul Bannon and Professor John O'Sullivan, and to have the support of The Baird Institute.

My research focuses on identifying proteomic patterns in aortic tissue from patients with thoracic aortic aneurysms (TAA), using samples from the Sydney Heart Bank. TAA are often asymptomatic until they rupture, which is associated with high morbidity and mortality. Unfortunately, current diagnostic methods are limited, and many at-risk patients are not identified before life-threatening complications occur.

Thoracic aortic aneurysms can arise from different causes. Some are linked to genetic syndromes such as Marfan, Loeys-Dietz, Turner or bicuspid aortic valve (BAV). Others run in families without being tied to a known syndrome (familial nonsyndromic TAAD). Many cases, however, are sporadic and typically associated with aging and risk factors such as hypertension, smoking or atherosclerosis.

In this project, proteomic data from healthy aortas will be compared with samples from patients with aneurysms, including sporadic, syndromic and familial nsTAAD.

Our hypothesis is that proteomic patterns differ between aneurysms and healthy controls and may also vary across aneurysm subtypes. By identifying such patterns, we aim to discover new biomarkers that could help detect high-risk patients earlier than current clinical tools allow and therefore decrease the risk of complications. Promising markers can then be validated in large population cohorts, such as the UK Biobank, to assess their predictive value for thoracic aortic aneurysms.

I am truly grateful for this opportunity and excited to spend the coming months in Sydney working on this project. It is a privilege to be part of such an outstanding research group and to contribute to research that may ultimately improve diagnostic methods for thoracic aortic aneurysms, methods that may help save more lives.

I am especially thankful to The Baird Institute and its supporters for making this research possible.

Many Thanks to Our Supporters

Every one of our donors has contributed in a significant way to our research and training programs and we are very grateful for their support. We would particularly like to thank our invaluable principal supporters.



Baxter

*Joy
to
the
World*

For a full list of all research publications of
The Baird Institute, please go to our website
www.bairdinstitute.org.au/our-publications/

DONATE
ONLINE VIA OUR
SECURE WEBSITE



bairdinstitute.org.au



 www.bairdinstitute.org.au

 **PO Box M85, Missenden Rd,
NSW, 2050**

 **02 9550 2350**

 **info@bairdinstitute.org.au**

 **facebook.com/ bairdinstitute/**

ABN 38 096 746 806

