



THE BAIRD INSTITUTE

Applied heart & lung surgical research



ANNUAL REPORT FINANCIAL YEAR 2021



A MESSAGE FROM OUR PATRON, The Hon Michael Kirby AC CMG

We should always be grateful for any year that we have lived, especially if it has been with family and friends. The Baird Institute does wonderful work to protect, preserve and prolong the lives of so many. Cardiovascular disease is such a huge challenge in our country. A lot of us, who support The Baird Institute, owe the gift of life to the skilled surgeons and brilliant researchers. As I do.

This past year has been extremely difficult for many of us. But also for The Baird Institute. This is therefore a difficult time for fundraising for the vital work of The Baird Institute which must continue and even expand. The funding has fallen in recent times.

In a period of uncertainty, this is understandable. However, medical research is the key to so much else in our world. For people with heart and lung disease and disorders, The Baird Institute's research is vital. It is a bright jewel of Australian medical and surgical intervention and research. And it has shone even more brightly during the dark months of COVID-19. All of us should try to help.

Even during the dark days of the pandemic, with the help of our supporters, The Baird's research has continued. Some of our scholarship recipients and our clinical trials teams have been finding the recruitment of patients for study difficult. Yet they have continued to progress. One of the Baird Institute's scholarship recipients, Dr Kei Woldendorp, has recently completed his Master of Philosophy degree.

The Institute has continued to support people in need of cardiothoracic advice and surgery. Led by Professor Paul Bannon, it has continued to pioneer research on aortic surgery, valvular surgery and myomectomy surgery and has established Australia's first comprehensive cardiovascular surgery biobanking program. This utilises tissues procured from aortic and other surgery. Those tissues are then utilised for research into various forms of heart disease.

Much research happens in the quietness of the brilliant minds of individual human beings. Whether it is with viral infections or heart and lung disease, we must support the scientists, surgeons and technicians of the future.

The past eighteen months have been dominated by the COVID-19 crisis in Australia and the world. The pandemic has prevented the usual friendly meetings of supporters of The Baird Institute, when they can learn of the medical and surgical miracles and take pride in the engagement with scholarship recipients and friendly gatherings with surgeons and researchers. We all hope that next year will return us to a normal world. COVID-19 has shown how we are all susceptible to disease and infection. But we are also susceptible to heart and lung disorders. They go on happening. And they need the vigilant work of "The Baird".

As this unusual year departs, we must have confidence that next year will bring great new achievements for The Baird Institute. We owe this to each other and the world.

Michael Kirby



A MESSAGE FROM OUR CHAIR

Professor Paul Bannon MB BS, FRACS, PhD

At Royal Prince Alfred Hospital our team performs more than 650 heart operations and 350 lung procedures each year making it the largest heart and lung surgical program in NSW. It also has the largest TAVI (Transcatheter Aortic Valve Implantation) program in the state. We are the most academic program in the country boasting more publications across a wide range of research interests than any other unit. Our specialty surgeries include major aortic reconstruction, minimally invasive valve and lung surgery, robotic surgery and beating heart bypass surgery. We pioneered the ECMO (Extracorporeal Membrane Oxygenation) retrieval program for acute heart and lung failure during the swine flu epidemic and continue that role during the COVID-19 pandemic.

We take great pride in the fact that each of our clinical programs is supported by a research program. This includes our teaching program, where we measure how well our targeted skills sessions hone a young surgeon's skills, before the surgeon takes their place at the operating table. The help of our amazing supporters makes all of this possible.

Our former Head of Department, Professor Douglas Baird, was instrumental in setting up the National Heart Foundation and in later years the Heart Research Institute. This reflected his unwavering commitment to surgical outcome reporting and the importance of basic scientific research in surgery.

This **Surgical Outcomes Research Program** has continued and expanded the work of Professor Baird, now with a database of over 11,000 patients which allows us to compare newer with more traditional surgical procedures, looking for the best survival results and best quality of life.

The **Sydney Heart Bank** at the Charles Perkins Centre, University of Sydney stores consenting patients' tissue and blood samples to facilitate future research into the genetic and epigenetic (such as smoking and blood pressure) causes of aortic aneurysm disease and heart failure mechanisms. This resource is truly one of a kind and has allowed multiple local and international research collaborations. Its linkage to the database provides us with a real chance to look back at what we have done to work out more timely and targeted interventions in the future.

Our **Clinical Trials Team** operates with the support of the Sydney Local Health District and has contributed to many International Trials that have shaped the way we do things today. Blood conservation techniques, the value of beating heart surgery and the performance of different types of heart valves, have all been investigated by the team over the years. They continue to contribute by being the lead investigators in several trials.

The most exciting part of the research program supported by The Baird Institute, the Department of Cardiothoracic Surgery and Sydney Imaging at the University of Sydney is the **Translational Research Program (TRP)**. The magic of the TRP happens in the basement of the Charles Perkins Centre (CPC) in the Hybrid Research Theatre which many of our supporters have visited. The Hybrid Theatre is a state-of-the-art facility comprising of a fully functional theatre with on table high resolution CT scanner controlled by a robotic arm. Here, in the Hybrid Theatre we are able to perform all forms of major surgery including heart surgery.

The Translational Research Program is divided into two parts. The first part called the **Innovative Robotic (iRobot) Program** looks at not simply operating with the aid of a robot but investigating just how much the robot can do without us. In essence, what can it do that we cannot? The Baird Institute and the Australian Centre for Field Robotics have joined forces and purchased the Kuka Robotic Arm to interface with the Siemens Artis Pheno robot to answer this question. The second part, called the **Broken Heart Program**, is the absolute pinnacle of what our research is trying to achieve. This is where we combine everything we know, and a wide range of skill sets to predict and model surgical corrective techniques to the individual. We then test the model in the research theatre by looking at the structural integrity of the repair.

We have had extraordinary early success with placing the smallest **heart support machine** (called an Impella) into the heart guided by an even smaller 3D ultrasound probe, placed through a neck vein to look at the heart. In time, this will allow us to treat acute heart failure in the sickest of patients without moving them from the Intensive Care Unit they need so much.

The real value of the Hybrid Theatre and the TRP is yet to be realised. The planned second stage of the development which involved the purchase of a 3D MRI scanner is currently at risk, ironically because of funding restrictions due to



the COVID-19 pandemic. The theatre site was designed and constructed to allow a dedicated 3D MRI scanner to be placed in line with the operating theatre which would have broad clinical and research applications. If we were to lose the capability to purchase this MRI it would be extremely limiting to this research program for the future.

These aforementioned programs have been supported by **The Baird Institute**, set up almost 20 years ago in honour of Professor Baird. The Institute's commitment to bettering the lives and improving the outcomes of those undergoing heart and lung surgery, by supporting clinical and basic scientific research, has never wavered and this would definitely not have been possible without the steadfast support of our donors, some of whom have been supporting us since our beginnings.

I thank the members of The Baird Institute Board, who gave their time and expertise to guide the Institute throughout the year. We are very grateful for their contribution and assistance over several years to help build and grow the Institute. In addition, we are delighted to welcome Dr Sean Lal who joined as Non-executive Director in September 2020. We look forward to a new and exciting year in 2021/2022 with research activities expanding across various disciplines as we continue to realise The Baird Institute's mission, to foster research and apply science to improve the outcomes for patients facing heart or lung surgery.

GOVERNANCE

The Baird Institute is registered as a charity with the Australian Charities and Not-for-profits Commission (ACNC). Eligible tax-deductible donations have Deductible Gift Recipient (DGR) status with the Australian Taxation Office.

WHO WE ARE

Established in 2001, The Baird Institute is the only dedicated cardiothoracic surgical training and research institute in Australia. A Sydney-based charitable organisation, the institute is operated by a small, multi-skilled team and supported by a board of pro-bono volunteers.

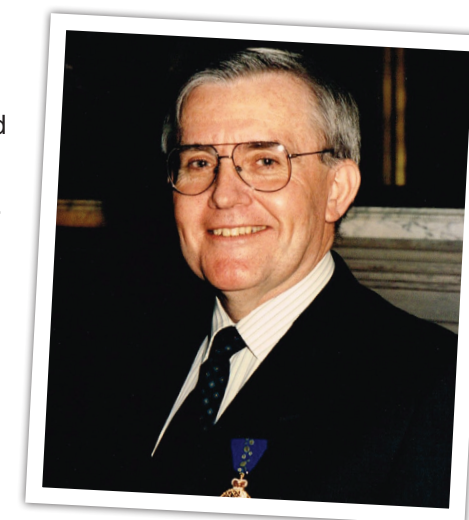
Our research model is a translational one. As an organisation, we focus on the translation of quality research into improved surgical practice and delivery of long-term public health solutions. This model incorporates expertise in surgical and clinical management with cutting edge research and surgical/health professional training to ensure we have a positive impact at all stages from diagnosis through to treatment and recovery of our patients.

DOUGLAS BAIRD

20 JUNE 1940 – 16 NOVEMBER 1995

"There was no better exemplar of the ideals of science, surgery, sensitivity and skill than Douglas Kevin Baird" – Professor Paul G. Bannon

Professor Douglas Baird was a truly great Australian with a passion for improving heart and lung surgical techniques for the benefit of all. A young Baird developed his passion for cardiothoracic surgery whilst an intern at Royal Prince Alfred Hospital (RPAH) and later became a Fellow of the Royal Australasian College of Surgeons (RACS) in 1971. His commitment to excellence in medicine and surgery was obvious as a medical undergraduate when, at Sydney University, he also completed a Bachelor of Medical Science (BMSc) and won seven prizes including the University Medal. In his eulogy, Baird Institute patron, the Honourable Michael Kirby, described him thus: "Sweet was his nature and notable his achievements".



A MESSAGE FROM OUR CEO

Ms Catherine Rush



What an unprecedented year we have had with many challenges on many fronts! Thanks to our dedicated supporters, who have continued to be so generous throughout these difficult times, we have been able to continue to fulfil our mission - to foster research and apply science to improve the outcomes for patients facing heart or lung surgery. Specifically, your support has enabled a world first pre-clinical study by Prof. Bannon and researchers from the University of Sydney who have demonstrated that a mini heart support machine called an "Impella" could be implanted in the heart of the sickest of patients with acute heart failure, without the need to move them from the Intensive Care Unit they need so much.

We welcomed Dr Sean Lal to the Board of The Baird Institute this year. Sean is an academic in the Faculty of Medicine and Health at the University of Sydney and a Consultant Cardiologist at Royal Prince Alfred Hospital (RPAH) and will be an excellent addition to the Board. In addition, Professor Martin Misfield joined the RPAH Cardiothoracic Department as Co-director of Research. Martin is a Professor, Senior Consultant and the Clinical Lead of Minimally Invasive Surgery (MIS) at the Leipzig Heart Centre in Germany, one of the pioneering centres in the world for MIS. The appointment of Martin to his research role will allow the Cardiothoracic Department to undertake clinical and basic research within an international network which of course will be extremely advantageous.

Our scholarship holders are continuing to work away on their research. We congratulate Dr Woldendorp, who has submitted the thesis for his MPhil and is currently awaiting allocation of examiners and marking. There is an interview

with Kei in this report so you will be able to discover more about his research.

Perhaps the most exciting news to report is the future for valve surgery. One day in the not-too-distant future we are hoping to be able to insert a valve into a patient's heart that is exactly suited to that patient, as opposed to using a valve off the shelf. As Professor Bannon explains; "based on the imaging of a patient's heart, whether that be with echocardiography, a CT scan or an MRI, we are able to individualise the repair of a patient's heart".

A story by a heart surgery patient, Alan Pope, in this Annual Report, also reveals the surgical advances that have been made from the time his grandfather was operated on in 1955, to when Alan himself was operated on in 2019 at the age of 40. All members of the family had aortic aneurysms. He speaks openly and proudly of the work of The Baird Institute. This is a case of helping three generations in need.

To every single one of our supporters, on behalf of the team at The Baird Institute, thank you for everything you make possible. None of what is mentioned in this Annual Report would be feasible without your help. We greatly appreciate your continuing trust and support.

Best Regards

OUR PATRON

The Hon Justice Michael Kirby AC CMG

BOARD OF DIRECTORS

Prof Paul Bannon, MBBS PhD FRACS, *Chair*

Prof Jeffrey Braithwaite, BA, MIR (Hons), MBA, DipLR, PhD, FIML, FCHSM, FFPHRCP (UK), *Non-Executive Director*

Mr Shaun Clyne, MA LLM (Syd), *Non-Executive Director*

Prof Richmond Jeremy, MB BS PhD, FRACP, FAHA, FESC, FCSANZ, GAICD, *Non-Executive Director*

Ms Joanne Wade, BEc, LLB, *Non-Executive Director*

Dr Sean Lal BMedSci (Hons), MBBS(Hons), MPhil(Med), PhD(Med), FRACP *Non-Executive Director*



From left to right: Erin McMullen, Sean Lal, Shaun Clyne, Catherine Rush, Richmond Jeremy, Jeffrey Braithwaite, Paul Bannon, Joanne Wade



From left to right: Sue Moore, Catherine Rush, Lorna Beattie, Cassandra Malecki, Dan Jackson

STAFF

- Professor Martin Misfeld - Co-Director of Research, Cardiothoracic Department, RPAH
- Ms Catherine Rush - CEO
- Ms Lorna Beattie – Clinical Trials Manager
- Ms Sue Moore – Administration and Events Manager
- Mr Dan Jackson – Database Manager & Research Assistant
- Ms Cassandra Malecki – Research Assistant
- Ms Erin McMullen, Company Secretary.

OUR VISION

Our vision is to improve the outcomes and enhance the lives of those undergoing heart and lung surgery.

OUR MISSION

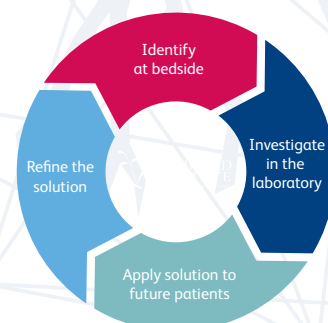
The Baird Institute's mission is to foster research and apply science to improve the outcomes for patients facing heart or lung surgery. The money we raise funds research that directly improves the surgical techniques associated with heart and lung surgery. Improvements can include less intrusive procedures as well as techniques that improve survival rates.

Through our commitment to ongoing research and the application of scientific breakthroughs in technology, we can directly impact the quality of life for patients, post-surgery and save lives that may otherwise have been lost.

Founded on the principal that academic surgeons produce better outcomes, The Baird Institute prides itself on continued investment in research and training; enabling it to remain at the forefront of innovation, surgical robotics and revolutionary industry technology.

OUR AIMS

- To Improve Patient Outcomes
- To Innovate
- To Conduct Research
- To Make Advances in Surgical Technology
- To Provide Ongoing Training and Development



NEW APPOINTEES



Professor Martin Misfeld MD PhD

CO-DIRECTOR OF RESEARCH, CARDIOTHORACIC DEPARTMENT, RPAH

We warmly welcome Prof Martin Misfeld. Martin is a Clinical Professor and Visiting Medical Officer in Cardiothoracic Surgery at RPAH. He is also the Co-Director of Research in the Cardiothoracic Department and a Senior Cardiothoracic Academic Advisor and International Proctor within RPA's Institute of Academic Surgery. In addition, Martin has an Honorary Professorship at the University of Sydney.

Martin was born in Hamburg, Germany, where he also went to medical school. He trained to be a Cardiothoracic surgeon in Luebeck near the Baltic Sea, in London and in Sydney. In 2009, he moved to Leipzig, in the former East Germany. The Leipzig Heart Centre is one of Europe's biggest cardiac centres with more than 3,700 heart operations performed each year. Martin is a Professor and Senior Consultant and the clinical lead of minimally invasive surgery (MIS) at the Leipzig Heart Centre which is one of the pioneering centres for MIS. It became clear, that following a close relationship with the

surgeons at RPAH, an international collaboration with a focus on MIS would be advantageous to further develop this surgical technique. As a result, Martin commenced part-time work at RPAH in 2019 and now divides his time between Leipzig and Sydney. The close collaboration between the Leipzig Heart Centre and RPAH is based on clinical work, offering the whole spectrum of MIS, the education and training of junior surgeons as well as the undertaking of clinical and basic research within an international network.

It is the strong belief of the Cardiothoracic Department that minimally invasive surgery and heart team decisions, where specialists from different clinical disciplines decide patient best treatment, will be the future and will be for the benefit of patients. Our collaboration enables us to teach, develop and evaluate these modern techniques as an international team who are at the frontline of cardiothoracic surgery.



Dr Sean Lal

BMedSci(Hons), MBBS(Hons), MPhil(Med), PhD(Med), FRACP

NON-EXECUTIVE DIRECTOR, THE BAIRD INSTITUTE BOARD

We warmly welcome Dr Sean Lal, Cardiologist, to the Board of The Baird Institute as Non-Executive Director. Dr Sean Lal is an Academic in the Faculty of Medicine and Health at the University of Sydney and a Consultant Cardiologist at Royal Prince Alfred Hospital, sub-specialising in heart failure and cardiac MRI. He is also the Chair of the Heart Failure Council for the Cardiac Society of Australia and New Zealand.

Sean has a clinical and research interest in heart failure. For his PhD in this field, he was awarded a combined National Health and Medical Research Council (NHMRC) and National Heart Foundation (NHF) Scholarship, as well as the NHMRC and Royal Australasian College of Physicians (RACP) scholarship for research excellence.

Sean was also awarded a Commonwealth Endeavour Postgraduate Fellowship to Harvard University and Massachusetts Institute of Technology (MIT), where he undertook studies demonstrating the intrinsic regenerative capacity of the

human heart following myocardial infarction; whilst also gaining clinical experience in acute heart failure management in the cardiac ICU at the Brigham and Women's Hospital.

Sean is the Director of the Sydney Heart Bank at the University of Sydney, which is one of the largest biorepositories of cryopreserved human heart tissue in the world. He is the Head of the Cardiac Research Laboratory in the School of Medical Sciences at the Charles Perkins Centre, which focuses on basic science and translational research into human heart failure.



Ms Cassandra Malecki

BMedSc (Hons).

RESEARCH ASSISTANT

Cassandra grew up in Sydney and completed a Bachelor of Medical Science at the University of Sydney, majoring in pathology. She completed her honors year in the Aortic Research Group at the Charles Perkins Centre at the University of Sydney, under Associate Professor Brett Hambly and Professor Richmond Jeremy. The Aortic group has a focus on investigating various factors that may alter the severity of aneurysms of the thoracic aorta, particularly in patients with the genetic connective tissue disorder, Marfan Syndrome. After a very successful 'honours' year, Cassandra decided to continue with a PhD in the same group and earlier this year submitted her PhD thesis which is currently under examination.

Cassandra is working as a research assistant with The Baird Institute in the Cardiovascular group, headed by Dr Sean Lal, Professor Paul Bannon and Professor Richmond Jeremy. This has enabled her to continue her research journey in the cardiovascular field, with a particular interest in heart failure and cardiac aging. Along with assisting with projects and experiments that are currently underway in the Lal lab, a major part of her role involves collecting precious human heart and aortic tissue samples and managing the Sydney Heart Bank database. Throughout her PhD, Cassandra spent much time collecting human aortic tissue which she was lucky enough to then use throughout her research projects and is therefore very excited to still be involved in managing such an important biomedical research resource that is the Sydney Heart Bank.

EDUCATION & TRAINING PROJECTS

Update

Dr. Brian Plunkett, Cardiothoracic Surgeon

Education and training for the registrars and junior medical officers at Royal Prince Alfred Hospital, started with a well organised and exciting rota of topics focussing on sessions to cement skills in sternotomy, chest management, cannulation and anastomosis. These sessions were conducted via a variety of means including wet and dry labs combined with simulation sessions. Didactic teaching sessions continued with a combined focus on cardiac anatomy, as well as continuing alliances with other allied specialised fields including critical care and anaesthesia. Unfortunately, the face-to-face teaching components of the program were significantly impacted by Covid-19, however alternative methods such as telehealth and videoconferencing, and smaller more focussed sessions were introduced to ensure learning opportunities were still being offered.



Scholarships and Grants Program

An Interview with Dr Kei Woldendorp

Cardiothoracic surgical registrar at Royal Prince Alfred Hospital, a Master of Philosophy candidate at the University of Sydney and the recipient of a *Baird Institute Scholarship*

What is your research topic?

Neurological injury after transcatheter aortic valve Implantation (TAVI). My research looks at aortic valve intervention post-operative stroke and neurological outcome. I am looking at both open surgical and minimally invasive techniques in my research.

What is the aim of your research?

To investigate the incidence, causes, and potential treatments of stroke and other neurological injury after transcatheter aortic valve replacement. The goal of this research is first and foremost to improve guidelines for patient selection as these procedures and techniques continue to evolve in the future, as well

as understanding how these patients progress after their procedure. Stroke remains a devastating although fortunately rare outcome for aortic valve intervention. By understanding the risk factors that underly stroke, we hope to improve patient selection into different pathways and streams of management for aortic valve surgery or intervention and in the rare instances where stroke does occur, we hope to understand how patients may progress and how treatment may help in their post-operative recovery, to reduce their burden or their quality of life.

What is the potential impact of your research?

As transcatheter aortic valve replacements (TAVI) expand to include lower risk and younger patients it is imperative to understand neurological injury associated with this procedure. An understanding of the causes may allow clinicians to develop new strategies to prevent or treat complications more effectively. An overview of this phenomenon may also allow clinical indications to be defined for TAVI to balance benefits and risk compared to alternative treatments such as surgical aortic valve replacement.

A total of 11 publications have been created through the research into this topic. Seven have been published and four are currently under review for consideration of publication in peer reviewed journals and will be submitted towards the end of the year for the award of the degree of Master of Philosophy at The University of Sydney.

How has your scholarship from The Baird Institute helped you?

I have been fortunate enough to have been supported by a scholarship from The Baird Institute throughout my research and it has really assisted me in gaining access to quite high-powered statistical software and hardware to analyse the data that we have collected. It has also allowed me to present my research at conferences both locally and internationally enabling me to share my ideas with my peers. By disseminating these ideas, we hope to garner more interest and start more research in this area to help improve patient outcomes and patient safety in the future. I thank all those generous supporters of The Baird Institute for giving me this great opportunity to attain an MPhil and do life-saving research.

A PATIENT STORY



A FAMILY'S HISTORY WITH AORTIC ANEURYSM DISEASE

Alan Pope shares his story

In 2017 at the age of 38, Alan Pope was living in Perth and had an operation while there to remove a cancer from his back. Following the operation, he underwent regular MRI and CT scans of the chest and was about to move to 6 monthly check-ups, when a radiographer noticed a size differential between his ascending and descending aorta. He was referred to a cardiologist in Perth who advised that as he had an aneurysm of the aortic root, he would likely need an aortic root replacement. As he had no family support in Perth, Alan moved to Sydney, where many of his family resided.

Alan's aortic root replacement surgery was carried out at Royal Prince Alfred Hospital in February 2019 with Professor Bannon as his surgeon. Due to his age and the fact that his aortic valve was functioning normally, Alan was a good candidate for a "David Procedure" – a valve sparing aor-

tic root replacement. This procedure is named after a Canadian surgeon, Dr Tirone David, who initially conceived the operation. By preserving the patient's aortic valve, the need for lifelong anticoagulation therapy is avoided.

6 days post-surgery Alan was discharged from hospital. He completed his rehab and within a couple of weeks of the operation, he was walking up to 10kms per day. He has maintained this regime and is benefiting immensely from the exercise and the weight loss.

Apart from high blood pressure, Alan had no indication that he might have an issue with his heart, however, when asked if he notices a difference now, he commented that he did not realise how much of a struggle it really was before! Professor Bannon explains that it is as a result of research that we are able to decide when the best time is to operate on patients with an

aortic aneurysm BEFORE the aorta dissects. When dissection happens a person's chance of survival is greatly diminished. Thanks to the support of our donors and their investment in our research, the mortality rate for people with an aortic aneurysm has significantly reduced.

Alan comes from a family with a history of aneurysms. In 1955, doctors found a dangerous aneurysm on the abdominal aorta of his great grandfather, Mr Leslie George Neale, and so at the age of 66 his grandfather underwent the first operation of its kind. Because there were no artificial aortic grafts in 1955, a suitable donor graft from a deceased person's abdominal aorta had to be found. Many hours were spent planning the operation. One of the major concerns was how to keep Alan's grandfather alive for the 12 or 13 hours required for a grafting operation of this kind. After he was given his anaesthetic, Mr Neale was wrapped in ice until his body temperature dropped to 29

FROZEN MAN 'GREAT'
MICKLE
37-4-53
A 66-years-old engine-driver, "frozen stiff" for 13 hours two weeks ago, said today he was "feeling great."
He is Leslie George Neale, Tenterdon Rd., Botany.
He underwent a rare operation in Sydney Hospital to have part of an affected main artery removed.
Doctors packed Neale's body in ice to lower his body temperature while an artery from a dead man's body was used to replace the affected section of an artery in Neale.

degrees. The diseased part of the artery was removed, and the donor graft was put in place. The operation lasted 12 hours.

In 1989, at the age of 42, Alan's father, Leslie John Pope, also had an aneurysm and suffered an aortic dissection in the posterior wall of the ascending aorta. Alan was just 10 years old and was watching his father replace a gear box under the car when it happened. Alan's Dad asked him to go and get him a cup of tea but when his father stood up, he collapsed. Paramedics were called and he was rushed to Prince Henry Hospital in Randwick. He required a total aortic root reconstruction along with aortic valve replacement surgery and received a synthetic graft (made of Dacron). He was discharged from hospital almost a month after his operation.

The type of surgery that Alan himself had would not have been possible in 1955 as the heart-lung machine was not in widespread use until 1964. In 1954 the machine was introduced into Australia and was used at Royal Prince Alfred Hospital with children, however its use with adults did not commence until 1957.

When Alan's grandfather was operated on in 1955, as the heart-lung machine was not available, the only way to do his type of surgery in the safest way possible at the time, was to cool the body down by putting the patient on ice. The mortality rate for this procedure was 50%, whereas now due to the heart lung machine, the rate of mortality for Alan's David Procedure at RPAH is basically 0% for elective patients (those patients choosing when to have their surgery as opposed to those who come into the emergency department as a result of a cardiac arrest or an aortic dissection) while the mortality rate for a standard aortic root reconstruction is .5%. Significantly different procedures and mortality rates, 65 years apart.

Today, the length of stay in hospital



In 1989, at the age of 42, Alan's father, Leslie John Pope, also had an aneurysm and suffered an aortic dissection in the posterior wall of the ascending aorta. Alan was just 10 years old.

is vastly different for those patients who have elective aortic root surgery (as Alan and his grandfather had). Patients are admitted to hospital on the day of their surgery and are discharged 6 or 7 days later. Leslie Neale in 1955, on the other hand, was in hospital for one month which was commonplace at the time.

Aortic dissections would not have been operated on back in 1955 when Alan's grandfather was alive, so Leslie was fortunate that he did not suffer a dissection. In 1989 when Alan's father had the dissection, approximately 50% of patients would not have made it to hospital in time and for the ones that did, the mortality rate would have been between 30 and 40%, with the best cardiac units getting that rate down to around 25%. Today we have managed to reduce that figure to about a 10% overall mortality rate for surgeries post an aortic dissection, as a result of the development of more refined strategies for dealing with the complications of a dissection.

Furthermore, we have been more

aggressive in our treatment than previously, we carry out far more extensive surgery to prepare for future problems and there have been significant improvements in surgical strategies which have vastly decreased the operative risk. Finally, our research has enabled us to predict people's risk of dissection and therefore decide when the optimum time for surgery is. Alan's surgery is a case in point, we operated on him before he dissected and with the support of you, our donors, we hope in the future to be able to avoid the passage of this disease onto the next generation.

Alan has a young family himself and, especially with his family history of heart problems, he is telling his story for them. He is keen to raise awareness and funds to provide more research into aortic aneurysm disease, so that other families do not have to go through what he has endured. Operating techniques have changed dramatically since the 1950s and the funding of our supporters has enabled significant innovation and improvements.

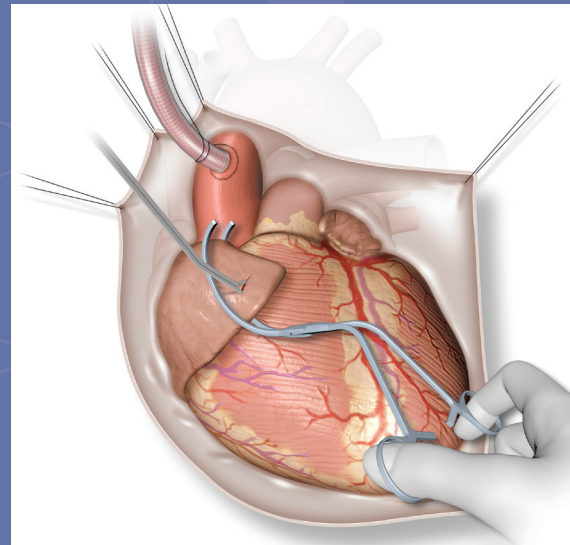
RESEARCH UPDATE

The Biobanking Program

Dr Sean Lal, Director Sydney Heart Bank

Bio-banking in health care has evolved over the last few decades from simple biological sample repositories to complex and dynamic units with multi-organisational infrastructure networks. Together, the Baird Institute, RPAH and University of Sydney have established Australia's first comprehensive Cardiovascular Surgery Bio-banking Program. Tissues are procured from aortic surgery, valvular surgery and myomectomy surgery (to treat hypertrophic cardiomyopathy) and cryopreserved at the state-of-the-art bio-banking facility at the University of Sydney. These tissues can then be used to facilitate translational research into the mechanisms of vascular disease and heart failure and hopefully lead to new therapeutic targets being discovered.

The figure adjacent shows how human heart tissue can be safely biopsied from the right atrium - only 2mg of tissue is needed to facilitate an analysis of some 4500 proteins in the human heart, which can then be undertaken in our research laboratories at the University of Sydney.



The Broken Heart Program

Dr Laurencie Brunel

Recently, we developed a model for looking at mitral valve repair. This model will assist us with the maintenance of heart function when we replace a mitral valve (or any of the heart valves) in a patient. With this research project, we are looking into not only how well the replacement of the valve corrects the valve function, but how well it affects the heart function. Specifically, this will assist with the evaluation of new technology valves as we are able to examine how well they will perform by testing the different designs in this model that we have developed.

The fundamentals of this whole research program will lead into the most exciting component of it - individualised programs for patient correction. Based on the imaging of a patient's heart, whether that be with echocardiography, a CT scan or an MRI, we are able to individualise the repair of a patient's heart. When we know the fundamentals of heart function, what we do to a heart and what that in turn does to the heart, then we are able to individualise treatment for a particular patient. So, rather than utilising a valve off the shelf, we would have a valve that suited the patient exactly.

Another exciting component of the study is that we are planning to utilise a 3D bioprint of a heart whereby we take a patient's scanned heart image, 3D print it and then place the 3D bioprint of the heart in our pump model so as to simulate the patient's

pump function. Using the information gained from the study on the best way to repair a particular patient's heart, the proposed repair is then tested on the 3D printed model of the heart. As can be seen, the whole program is centred around individualisation rather than off-the-shelf correction, but it also forms a platform that allows us to test the technologies that are being produced by the big valve companies, in addition to allowing us to test our own designs. The work we are doing at present involves testing current techniques for valve repair and replacement and examining what impact they have on heart function, in addition to testing the impact the new technology valve replacements have on heart function.

Although this research has focused on the mitral valve, in the future, we intend to look at the Tricuspid valve and the aortic valve, in addition to other areas of the heart so as to

ascertain as much information as possible on heart and valve function.

Thoracic Database

A/Professor Chris Cao and Dr Nicholas McNamara

With generous support from the donors of The Baird Institute, the Royal Prince Alfred Hospital's Department of Cardiothoracic Surgery recently re-established a Thoracic Database to collect clinical data for patients undergoing thoracic surgery. The primary function of this Database is quality assurance of key performance indicators; however, the database also serves as a useful tool for academic research. After a preliminary period of 6 months trialling the new database, a Departmental review was conducted and we are excited to report that the revision process undertaken in 2019 to develop a more complete database has been a success. Data completion rates for pre and postoperative outcomes have improved significantly, from an average of 50% in 2019 to over 90% for the majority of variables (eg. patient baseline characteristics, operative details, postoperative outcomes, and long-term survival) in 2020.

Importantly, we have been able to achieve very high data completion rates for all variables in patients who underwent Robotic-assisted thoracic surgical procedures. As one of the only public hospitals in Australia that offers Robotic-assisted thoracic surgery, we are at the forefront of developing such a programme and demonstrating a benefit to patients without compromising safety. To date, we have performed 29 robotic surgeries with an excellent safety profile. Future work in this area will focus on collecting postoperative pain data to assess whether this minimally invasive approach leads to reduced pain and faster return to usual daily activities.



Publications

ACS – Annals of Cardiothoracic Surgery

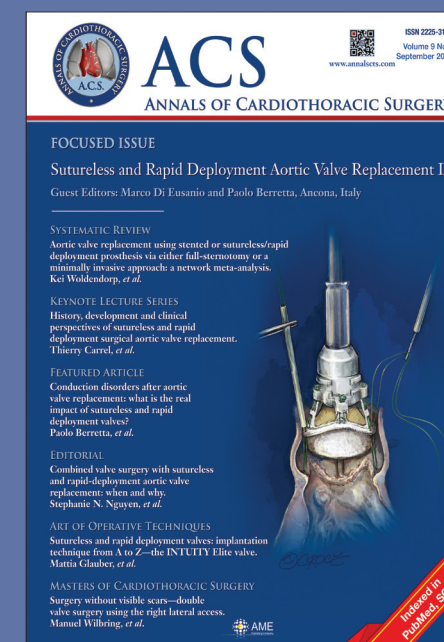
The Annals of Cardiothoracic Surgery is delighted to announce that its continued strong growth in the cardiothoracic surgery field has been reflected in a new higher Impact Factor of 3.058 as released by Clarivate Analytics in their latest Journal Citation Reports.

This Impact Factor reflects ACS' ongoing and increasing value to the scientific community, confirming its importance as one of the leaders in the communication and advancement of academic research. ACS is thrilled with this achievement, made possible by the tireless efforts of our esteemed editors, authors and readers who continue to recognize the value of ACS' unique themed-issues through citations in their own work.

Visit <http://www.annalscts.com/>

Other Research Publications

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



OUR SUPPORTERS

Since its inception, The Baird Institute has been privately funded by bequests left by former patients of the surgeons who are associated with the Institute, corporate funding from our partners and donations received from our supportive group of donors who provide both donations to continue our research and their time in organising fundraising events for The Baird Institute. We greatly appreciate their unwavering support.

Partners In Research

We are very lucky to have a group of committed supporters who provide donations to The Baird Institute on a regular and continuing basis. Our **Partners in Research** support us because we deliver long term life-changing solutions that can save lives and make such a difference to people living with chronic disease. The steady stream of funding from our **Partners in Research** provides some certainty for The Institute in a competitive and unpredictable funding environment and allows us to plan for the future with confidence.

Corporate Supporters

Special thanks go to our corporate partners - Medtronic, Baxter, Abbott and Edwards who are providing assistance in the form of educational grants for research scholarships and grants to trainee cardiothoracic surgeons.



Medtronic

Baxter



Philanthropic Supporters

Lin Huddleston Charitable Foundation
Pro Choice Safety Gear – The Bird family



Bequests

Peter John Ford passed away in 2019 and in May 2021, The Baird Institute received a bequest of \$76,500. Mr Ford's generous bequest will assist The Baird Institute in continuing to fund research into improving the outcomes for heart and lung surgery patients. We are very grateful to Mr Ford and his family for their very generous support.

FINANCIAL SUMMARY

Profit & Loss Statement

Revenues

| | 2020-2021 | 2019-2020 |
|--------------------------------|------------|------------|
| Research and Training | \$ 258,578 | \$ 231,971 |
| Donations and Fundraising | \$ 292,752 | \$ 522,275 |
| Miscellaneous | \$ - | \$ 28,865 |
| Interest and Investment Income | \$ 53,242 | \$ 11,303 |
| Government Covid Stimulus | \$ - | \$ 72,780 |

| | | |
|--------------|-------------------|-------------------|
| TOTAL | \$ 604,572 | \$ 867,194 |
|--------------|-------------------|-------------------|

Expenses

| | | |
|--------------------------------|------------|------------|
| Employee benefits | \$ 213,830 | \$ 310,475 |
| Research consumables/equipment | \$ 79,451 | \$ 33,569 |
| Office expenses | \$ 22,560 | \$ 71,839 |
| Depreciation | \$ - | \$ 1,349 |
| Fundraising/Marketing | \$ 39,766 | \$ 22,351 |
| Miscellaneous | \$ 347 | \$ 4,469 |

| | | |
|--------------|-------------------|-------------------|
| TOTAL | \$ 355,954 | \$ 444,052 |
|--------------|-------------------|-------------------|

| | | |
|---------------------------------------|-------------------|-------------------|
| Surplus/Deficit for the period | \$ 248,618 | \$ 423,142 |
|---------------------------------------|-------------------|-------------------|

Balance Sheet

Assets

| | 30/06/2021 | 30/6/2020 |
|-----------------------------|-------------|-------------|
| Cash and cash equivalents | \$1,314,971 | \$1,053,778 |
| Trade and other receivables | \$ 14,240 | \$ 36,392 |
| Other current assets | \$ 2,635 | \$ 1,857 |

| | | |
|--------------|--------------------|--------------------|
| TOTAL | \$1,331,846 | \$1,092,027 |
|--------------|--------------------|--------------------|

Liabilities

| | | |
|--------------------------|-----------|-----------|
| Trade and other payables | \$ 23,715 | \$ 25,383 |
| Employee entitlements | \$ 15,394 | \$ 22,523 |
| Other liabilities | \$ 5,600 | \$ 5,600 |

| | | |
|--------------|------------------|------------------|
| TOTAL | \$ 44,709 | \$ 53,506 |
|--------------|------------------|------------------|

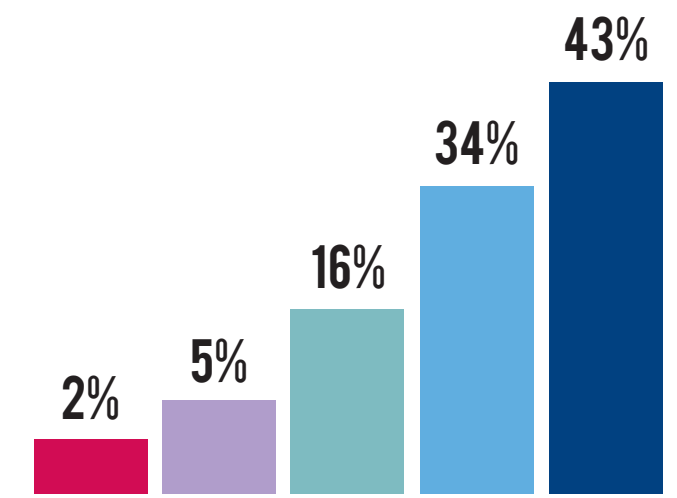
| | | |
|-------------------|--------------------|--------------------|
| Net Assets | \$1,287,137 | \$1,038,521 |
|-------------------|--------------------|--------------------|

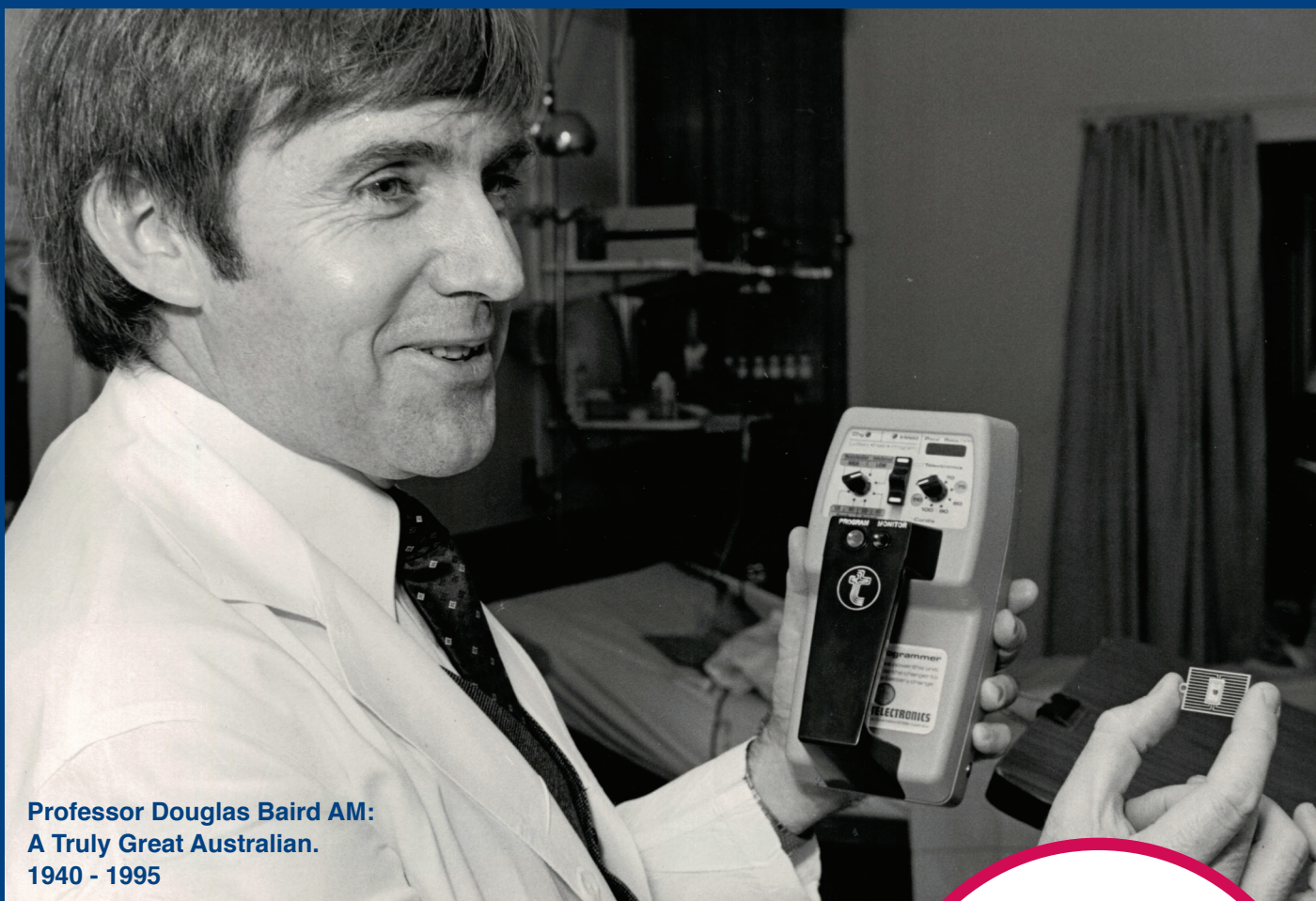
The figures above have been taken from the audited financial statements of The Baird Institute for the relevant periods.

ORIGIN OF DONATIONS

2020-2021

- Community fundraising
- Philanthropy
- Bequests & memorials
- Industry partners
- Appeals, recurring & general donations





Professor Douglas Baird AM:
A Truly Great Australian.
1940 - 1995

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

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 www.bairdinstitute.org.au

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