



heart TO HEART

THE BAIRD
INSTITUTE
Applied heart & lung surgical research

DECEMBER 2022

Centre For Heart Failure AND DISEASES OF THE AORTA



The Baird Institute has partnered with the University of Sydney and Royal Prince Alfred Hospital to establish an exciting new **Centre for Heart Failure and Diseases of the Aorta**. This new venture aims to make advances in the discovery, diagnosis, and treatment of **heart failure** and **aortic diseases**. The Centre's overarching aim is to accelerate novel discovery to improve outcomes for patients with heart failure and aortic disease.

Led by Professor Paul Bannon, Professor John O'Sullivan, and Dr Sean Lal, the centre will apply its unique resources and expertise to address major unmet needs in these fields. The new Centre has a world-leading bench-to-bedside program that has several unique resources on a global scale: Heart Failure Biopsy Programs not available anywhere else; the World's Largest Heart Biobank; one of the world's only Aorta Biobanks; and pre-clinical models of Heart Failure and Aortic Disease.

The Centre has a strong governance structure carefully facilitating the linkage between basic science, clinical translation, consumer outreach, and commercialisation. The Centre has established and leads two active clinical trials in heart failure. It will be in a position to capitalise on opportunities in the emerging biomedical precinct incorporating the Sydney Biomedical Accelerator and Tech Central. These strengths coalesce at a critical juncture and will drive important advances in Heart Failure and Aortic disease and improve patient outcomes.

Introducing Our Newest Staff Member

Dr. Robert Hume PhD, Senior Postdoctoral Fellow,
*The Rob Bird Aortic Research Program, Centre for Heart Failure
and Diseases of the Aorta.*



Growing up in England, I completed my undergraduate and master's degree in Biomaterial Science and Tissue Engineering at the University of Sheffield, UK. After a short period as a research assistant in Sheffield, I then undertook a PhD in pathology at the University of Cambridge, UK. At this point, I decided it was best I left rainy England and set sights for brighter (and sunnier) pastures. I was then fortunate enough to secure a position as a Postdoctoral Research Associate in Associate Professor Dr James Chong's Cardiac Regeneration Laboratory at the Westmead Institute for Medical Research, Sydney. During this time, I investigated novel therapeutics to treat heart failure and their underlying mechanisms.

I have recently started a Postdoctoral Fellowship at The Baird Institute within the newly established **Centre for Heart Failure and Diseases of the Aorta**, headed by Professor Paul Bannon, Dr Sean Lal, and Associate Professor Dr John O'Sullivan. This incredible opportunity will allow me to undertake ground-breaking research into heart failure, cardiac regeneration and diseases of the aorta. My research will focus on tapping into the heart's ability to regenerate that is suppressed in adulthood and using this mechanism to treat the failing heart. I will also be focusing on engineering new aortic tissue with the intention of replacing and repairing diseased aortas. Through high-end laboratory experiments, access to precious human samples and the support of the team around me, high impact publications are on the horizon, which will help shape the future of cardiac and aorta research.

Robert's 3-year fellowship has been generously funded by the Bird Family. Rob Bird died of an aortic dissection in 2010 and his family have made a commitment to funding aortic disease research at The Baird Institute. As a result, we have named the aortic research program after Rob Bird.



THE CARDIAC PRECISION GROUP AND THE AORTIC RESEARCH GROUP

Dr Cassandra Malecki, BMedSc (Hons), PhD

Since starting in this postdoctoral position, I have assisted with the progression of multiple projects within the cardiac precision group and the aortic group, overseen the collection of tissue and management of the Sydney Heart Bank and initiated my own research project and research questions.

Coming from a background in molecular biology, I was first able to assist in helping students in executing techniques in the lab to examine the level of expression of relevant genes in heart failure samples and how these levels compare to those in healthy hearts. I have also been

involved in helping prepare samples for large-scale analysis of human aortic and cardiac samples, which have allowed for the investigation over 4500 proteins and genome-wide RNA expression in different types of heart failure and aortic disease, contributing to the findings of multiple projects, with some currently being written up for publication.

I was given the chance to take the lead on an exciting project investigating the changes that occur in the heart as we age. Age is one of the biggest risk factors of heart failure, and therefore understanding the changes that occur in the heart as we age will assist in the development of preventative and therapeutic options for heart failure. We are currently looking at levels of proteins, metabolites, and lipids and the expression of thousands of genes in hearts of individuals over the age of 50 and comparing these to hearts of individuals 20 and younger. This is the first ever study to characterise the molecular changes that occur in normal ageing of the human heart. We have found very interesting and novel results including changes in levels of contractile proteins and seen how the heart changes its ability to utilise energy as we age. We are currently writing up the results of this study, with the aim to submit it for publication before the end of 2022, to a highly prestigious scientific journal.

Most of this research is made possible due to the utilisation of the unique resource that is the Sydney Heart Bank. A major part of my role has involved collecting precious human heart and aortic tissue samples from RPAH, processing the tissue, managing the Sydney Heart Bank database, and preparing samples for other members of the lab and collaborators around the world who are using the tissue for their own research projects. I have also optimised protocols for tissue collection and processing and have put systems in place to keep thorough track of samples coming in and out of the heart bank and tracking sample information.

To expand on the cardiac ageing project mentioned earlier, I have taken a particular interest in developing a project that examines how the aorta changes at a molecular level with age, and how these changes may impact the heart. The aorta naturally becomes stiff as we age. The stiffer the aorta is, the harder the heart must work to pump blood into the aorta and around the body. If the heart is under these higher stresses for an extended period, this can lead to heart disease. Therefore, understanding the relationship between the aorta and heart in ageing may bring to light new therapeutic options for heart disease. After thoroughly examining the Sydney Heart bank database, I identified healthy heart tissue and healthy aorta that were from the same individual, with samples covering a wide age range. I have used these samples to examine the molecular relationship between the aorta and the heart as we age. Currently, genome-wide RNA expression and protein levels of the tissue samples have been completed, with the data to be analysed in the next few months and future experiments in the planning process.

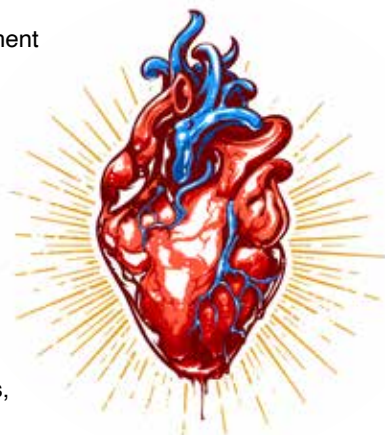
CLINICAL TRIALS UPDATE

Lorna Beattie, Lisa Turner and Carmel Oostveen, the Clinical Trial co-coordinators, coordinate all Cardiovascular Clinical Trials within Royal Prince Alfred Hospital (RPAH) assisted by Dhairya Vayada who is a research assistant employed by The Baird Institute who assists with research and data management within the department.

There continues to be challenges following the pandemic, but we are happy to say that the recruitment for clinical trials and biobanks at RPAH are on the rise.

RPAH ran the TRiCS III trial back in 2015-2016 which assessed transfusion strategies in patients having heart surgery. This trial showed that a restrictive blood transfusion strategy is as effective as a liberal strategy. However, it was also noted that restrictive transfusion practices may put younger patients at risk of harm and TRiCS IV will now be assessing blood transfusion strategies in a younger patient population. The research team hope to commence TRiCS IV at RPAH in December.

The team are also working on an application to CHeReL (Centre for Health Record Linkage) for a mass data linkage project looking at long-term outcomes in cardiac surgery for 12,000 patients which will have a significant impact in the cardiovascular space. There are several students, registrars and Cardiothoracic Trainee's involved in the process of collating and analysing data.



Dear Valued Supporters

This has been an exciting year for us because, amongst other things, it is the year of our 21st birthday. 21 years has seen The Baird Institute develop from a typical surgical research group focusing on surgical outcomes, to basic science research and finally to translational research. Translational research is the process of taking a discovery from the laboratory into the clinic, where it can ultimately help people. Often referred to as "bench to bedside" research, translational research involves testing hypotheses in the laboratory, bringing new treatments to the bedside to determine their effectiveness in patients, and finally evaluating if these new treatments lead to improved public health.

Over the years, The Baird Institute has fostered multiple PhDs, Masters, and basic science programs. It has featured prominently in some of the major publications around the world and has been involved with the RPAH Cardiothoracic Department in some of the major heart and lung clinical trials published to date. All of this has impacted directly on patients' lives through better surgical procedures, better surgical follow up and better recognition of the needs of the individual.

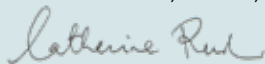
Just like we traditionally come of age at 21, so has The Baird Institute, formally recognising, partnering with, and supporting the **Centre for Heart Failure and Diseases of the Aorta**. This maturation has been a long time coming, setting the basics and the fundamentals with the largest single unit surgical database, the most sophisticated analysis of surgical outcomes, the only database linked with the largest cardiac muscle and aortic tissue biobank in the world (known as the **Sydney Heart Bank**). All of this infrastructure lends itself easily and appropriately to solving at the bench some of the biggest problems facing our patients.

The Baird Institute is excited to support the **Centre for Heart Failure and Diseases of the Aorta** with its focus on three major areas; innovative heart valve design, heart failure and the biomechanics of the human aorta. A big welcome to Dr Robert Hume, our post-doctoral fellow who will lead a team in this centre to utilise human and model system heart failure so as to understand key disease processes in heart failure and aortic disease. One exciting thing that he will focus on is engineering new aortic tissue with the intention of replacing and repairing diseased aortas. I am sure you would agree with me that this sounds pretty amazing! Generous supporters of ours, the Baird family, are greatly assisting us in the funding of Dr Hume's fellowship over the next 3 years and for this we are most grateful.

Finally, inside this newsletter you will read Shaneel's story. Shaneel is a patient of cardiothoracic surgeon, Dr Brian Plunkett. I would like to thank Shaneel for sharing with our readers his journey after having been diagnosed with Rheumatic Heart Disease at the age of 13. Shaneel was the youngest patient ever in NSW to have the TAVI valve implantation procedure at the young age of 37.

To all of our wonderful supporters, on behalf of the team at The Baird Institute, a sincere thank you to all of you for your continuing trust and support. I couldn't be more thankful for your dedication and generosity. **Our work is possible because of you.**

Best wishes to you and your families for the holiday season and for a healthy and happy 2023.



Catherine Rush
CEO, The Baird Institute



A NOTE FROM OUR PATRON

The Hon. Michael Kirby AC CMG

"Have A Heart"

How excited my old university friend, Doug Baird, would be to see the continuing work of medical practice, research and public health promotion that is still being carried out in the Institute that bears his name.

Doug Baird, later top Professor of the University of Sydney and brilliant surgeon, helped pioneer the earliest coronary artery graft surgery that has led on to the most remarkable developments in surgical and medical practice. So many lives saved. So much suffering avoided. So many future coronary experts educated. So many friends and colleagues from overseas countries learning from Professor Paul Bannon and the Baird Institute. Paying back with their precious contributions.

The biggest news to be celebrated at this time at The Baird Institute is the establishment of the Centre for Heart Failure and Diseases of the Aorta. This is described elsewhere in this newsletter. It is a new venture that aims to make further advances in the discovery, diagnosis and treatment of heart failure and aortic diseases. The fundamental objective of the Centre is to accelerate new discoveries so as to improve outcomes for patients. The new Centre represents a fresh collaboration between the Baird Institute, the University of Sydney and Royal Prince Alfred Hospital. What a trio of intellectual brilliance and practical clinical help.

I congratulate Dr Robert Hume on his appointment to a post-doctoral fellowship in the Centre. He will lead a team to utilise human and model system heart failure.

One might suspect that surgeons, cardiologists and thoracic experts are cold clinicians. But they too "have heart". In September 2022, I participated in part of the 21st birthday celebrations of The Baird Institute with a concert titled "Harp to Heart" that took place at the Sydney Conservatorium of Music. The Doctors' Orchestra entertained supporters and guests of The Baird Institute. They demonstrated the sensitive side of the Baird and its wider family. It was a great joy to see my friend Doug's widow, Philippa Baird, present with members of their family. Music, like medical science, deals with eternal values. We now look ahead to more progress in 2023. I hope that readers of this Newsletter will make donations to support this work, so far as they can afford.



Patron, The Baird Institute





Shaneel's Story

Rheumatic Heart Disease

I would like to thank The Baird Institute for giving me this opportunity to tell my story, it's an honour.

I was diagnosed with Rheumatic Heart Disease at the age of 13. It was all very odd how it happened. I remember having a stomach ache that just wouldn't go away and somehow during all the check-ups and tests, my GP picked up something in my heartbeat which eventually lead to the diagnosis.

The rest of my teenage and young adulthood years was pretty uneventful. I would have my regular yearly check-up with my cardiologist, but otherwise my life was normal; lots of sports, plenty of laughs and good food. My cardiologist did always remind me that my leaky aortic valve would need to be replaced one day. I also knew it was coming but I guess I always thought of it as an "I'll deal with it when it happens" type of situation.

That day did come eventually in 2011. I still hadn't felt any symptoms from this condition that I had carried for at least 16 years, but I guess my valve had passed that safe threshold in the eyes of my cardiologist and it was time to operate. The operation itself went smoothly, I know having open heart surgery wasn't exactly straightforward but from what I could tell,

everything went to plan. I now had a new tissue valve which would take me through the next 5-15 years of my life.

Post-surgery I eventually went back to my once-a-year check-up schedule. I got married, had 2 beautiful kids and just carried on like most other people.

Now, fast forward to October 2021 and things started to change.

I knew I was getting older, but this felt a bit different... struggling for breath was not something I was used to, but I ignored it for the first month. As the weeks and months passed by things slowly but surely got worse. Basic everyday tasks just seemed so difficult, and my quality of life was dropping fast. In January 2022, my cardiologist confirmed what I already suspected. The tissue valve that I had received in 2011 was now deteriorating quickly and we had to get it replaced again.

Pre-surgery tests were booked in but I never made it to those appointments. I checked myself into Burwood Emergency department late February 2022 after struggling through a tough 24 hours at home. In hospital I was told that my lungs were full of fluid due to my weak heart valve, and they would basically

stabilise me until they could find an operation timeslot at RPA where the surgery had to be done... hopefully within the week. That week was a struggle, the doctors and nurses were fantastic, but I think my heart valve was giving up fast. A week later, I was transported to RPA via an ambulance with lights and sirens. I was told that this trip would take 20 minutes, but it felt like 20 hours! This was the worst I had felt throughout my entire experience thus far. I felt like I was drowning, each breath felt like it was going to be my last.

Once I got to RPA, the ICU team could see that I really wasn't looking too good. That's where I first met Dr Plunkett who was the cardiothoracic surgeon on duty. After stabilising me and quickly going through the documentation of the many many tests I had already done over the last week, I was told of the grim reality of my situation by Dr Plunkett. My heart is operating at 20% capacity and the situation isn't great. The next set of words that he said, I will never forget... "I will do my best to get you out of this situation mate, don't you worry".

I wouldn't be able to have the original open-heart surgery as originally planned as that would more than likely kill me, so Dr Plunkett worked with his colleagues to devise a new plan. They would insert a new tissue valve (via keyhole surgery)



APPOINTMENTS TO THE BOARD OF THE BAIRD INSTITUTE

We warmly welcome A/Prof Christopher Cao, Mr. Ross Saunders and Ms. Jivani Murugan to the Board of The Baird Institute as Non-Executive Directors.



Associate Professor Christopher Cao
BSc (Med), MBBS (1st Hon), PhD, FRACS

Associate Professor Christopher Cao is a Consultant Cardiothoracic Surgeon at Royal Prince Alfred Hospital, Concord Hospital, Chris O'Brien Lifehouse, Macquarie University Hospital, and Sydney Adventist Hospital.

Christopher graduated with First Class Honours from the University of New South Wales and scored 99/99 in both steps of the United States Medical Licensing Exam. This was followed by a pre-internship at Yale University, USA. After his cardiothoracic surgical training with the Royal Australasian College of Surgeons in Sydney, his specialist Fellowship training was completed at the Memorial Sloan Kettering Cancer Center in New York, USA, the world's oldest and largest private cancer center. He was then invited to be a Faculty Member in the Department of Cardiothoracic Surgery at New York University Medical Center, where he gained additional experience in minimally invasive cardiac surgery as well as heart and lung transplantation.

Associate Professor Cao has authored or co-authored more than 100 articles in high-impact international scientific journals and textbooks. His PhD with Sydney University was focused on the surgical management of pleural and lung cancers. He is the first author in one of the largest international registries on robotic surgery to date. His clinical interests include minimally invasive and robotic thoracic and cardiac surgery.



Mr Ross Saunders

Ross is a business leader based in Sydney and originating from the United Kingdom. He currently runs the Australia & New Zealand operation for a global manufacturer with specialisation in business transformation, governance & compliance, program management, and strategic planning.

With particular interest in organisational transformation, Ross has led business and digital transformation programs across several global and national organisations including RS Group plc, Wesfarmers Industrial & Safety and Essentra plc.

Notably, Ross is also a post-operative recipient of valve-sparing aortic root replacement surgery, provided by Prof. Bannon and his team at Royal Prince Alfred Hospital, Sydney.



Ms Jivani Murugan
BSocSc

Jivani is a Policy Officer employed at the Aboriginal Health and Medical Research Council of NSW. She is a Criminal Justice graduate from Macquarie University and is passionate about reducing health inequities for all communities. Jivani was born with a congenital heart condition and has had three open heart surgeries since her first at 10 days old. Her most recent, at age 23, introduced her to The Baird Institute and Professor Bannon.

Jivani campaigned for our 2021 Mid-year Appeal to fundraise and spread awareness of cardiothoracic surgery. She is an advocate for heart health and uses her position as a patient to raise awareness in the community and continues to showcase how surgery has saved her life. Jivani has enrolled in a Master of Public Health at Macquarie University commencing in 2023.

and basically push out the old tissue valve.

I woke up with the usual tubes and needles which I had experienced all before in 2011 but unbeknown to me, I had actually been in an induced coma for 5 days. As I slowly got to piece together the events after I had been put to sleep, I came to know exactly how lucky I was to be alive. To start off, my body had initially rejected the life support machine, so I went into cardiac arrest. I had to google this term 'cardiac arrest' when I was told it, but I don't think I will ever forget it!

Second term that I had to google was 'ECMO'. Extracorporeal Membrane Oxygenation, a mouthful, but this amazing machine kept me alive and gave my heart and lungs a break. A break that was needed before any surgery could be performed. The rest of the recovery was straightforward, especially in comparison to the events that led up to it. I'm alive and now well, feeling great but also grateful. Things could have been so different, but a combination of great people and world class medical technology is why I'm here today telling my story.

The important research and development done at The Baird Institute will ensure there will be many stories like mine in the days, weeks, and years to come.



Medicine With Heart



Dr Cathy Fraser, Founder and President of NSW Doctors Orchestra

Dr Louise Baird's love of being in a hospital started as a young child when she would go with her father, Cardiac Surgeon, **Professor Douglas Baird**, to Royal Prince Alfred Hospital on Sundays. While he visited his patients pre-operatively, she would sit in the nurses' office. These treasured childhood memories were to shape her life. She knew that her parents had met over a patient at the old Camperdown Children's Hospital, where her mother worked as a paediatric nurse. When she later saw Doug's Medicine graduation photo, she recognised her grandfather in the background. Doug's former Physiology Professor was father of his future wife. It was from Louise's grandfather that Doug had learned all his research skills during his BSc Med Honours year at Sydney University. It was as if featuring by chance in the photo was heralding future connections.

Louise Baird's love of music started at a similar age. She remembers that when she was 5, she wanted to play the piano like her older sister. Luckily for Louise, a piano teacher lived behind them. From their backyard, she could hear students during their piano lessons, and longed to be playing the same pieces. She soon was. Louise's musical aspirations grew when she heard a neighbour two doors down, playing the violin. Louise picked up the violin at the age of 8 and hasn't stopped since. She has fond memories of playing in her school orchestra and in the Sydney Youth Orchestra.

When Louise was a 1st year medical student at UNSW, she heard of the Australian Doctors Orchestra playing in Sydney in 1997 in aid of the Glaucoma Foundation. She was thrilled to hear that the orchestra was not just for doctors, and that medical students were also welcome. She remembers being nervous coming in to her first rehearsal, choosing to sit at the back of the section of second violinists, not knowing anybody. She needn't have worried. The GP she shared her desk with became a lifelong friend. That was the welcome beginning of Louise balancing her life in both medicine and music. In 2004 I founded the NSW Doctors Orchestra. Louise heard about it the following year on returning from working overseas and has played in most of our concerts since. Over the years, Louise picked up trinkets of valued advice from her fellow musicians, not just about medicine and training, but also about motherhood, about life. She welcomes orchestra gatherings as an opportunity to touch base with her mentors.

"It is so lovely to come together again" she says. "Each year this is the time just for me."

Louise cannot imagine life without the Doctors Orchestra. She values these opportunities which have helped her keep up her music despite a busy life with work and family commitments.

"As soon as I know the repertoire for the next concert, I download the music onto my phone and listen to it driving to work and during my exercise walks. That way, even if I can't fit practice in that day, I'm at least becoming more familiar with the music."

She feels the benefit of using a different part of her brain.

"Music calms me down. It is my escape. I feel as if my brain has been on a holiday. We strongly believe that taking care of our creative health helps us in our work and contributes to our general wellbeing."

During the pandemic, many of our members confessed to regretfully neglecting their instruments. This is equivalent to an athlete stopping training. We can't expect to keep up skills and techniques without practice. Not having a 'marathon' concert to train for stopped medical musicians in their tracks.

The orchestra thoroughly enjoyed reconnecting in preparation for the "Harp to Heart" concert staged in the Verbrugghen Hall in the University of Sydney's Conservatorium of Music on Sunday 25 September. The concert was opened with a fun piece called "Roar" composed by Tasmanian Maria Grenfell. Virtuoso soloist Alice Giles played Boieldieu's harp concerto to an enthusiastic audience. The second half featured Tchaikovsky's Symphony no. 6 in B minor, the passionate Pathétique. The word 'symphony' means being together in sound, and that was certainly the magic the medical musicians welcomed after a harrowing few years of relative isolation.

This year's concert had special significance for Louise, as the funds raised were donated to **The Baird Institute**, established in honour of her father Professor Douglas Baird. It was also an opportunity to raise public awareness of The Baird Institute, being Australia's only dedicated cardiothoracic surgical training and research institute, committed to directly impacting the quality of life for patients after surgery and save lives that may otherwise have been lost. Louise talks lovingly of her father and his legacy. He was a pioneer in cardiothoracic surgery in Sydney, trained the current leaders and was a mentor to all who followed in the field. His untimely death from cholangiocarcinoma, just 6 weeks after his diagnosis, at the early age of 55, would have been a devastating loss to his family, friends, patients and colleagues. Louise was just 16 when she lost her father. She remembers him as a leader who picked up on people's strengths and focused on them. Dr Louise Baird is certainly following her father's legacy in her care of patients and mentoring of students.



Musicus Medicus aims to improve the health and wellbeing of Australians by using the universal language of music to raise money for charities in medicine and the arts. For more information, go to www.thedoctorsorches-transw.com.au



Carol Fraser

ART IN SURGERY

In late September 2018, at the age of 75, I underwent a triple heart bypass operation performed by Professor Paul Bannon at Royal Prince Alfred Hospital, having been referred to him by my cardiologist, Dr Sean Lal.

The operation was very successful and the care I received at RPAH was outstanding. I am sure that this care helped in my good recovery. Prior to the surgery, I consented to participate in the 'Art in Surgery' program whereby an artist – Simon Fieldhouse - came into the operating theatre and did a painting of me undergoing heart surgery. The painting is adjacent.

I have 3 sons, Simon, Andrew and Paul. The artist was Simon, the ICU Doctor was Andrew and the Surgeon was Paul!! – maybe a good omen!

I am mindfully indebted to the wonderful expertise of the medical and nursing staff for my now good health and extended life and as such I decided to support The Baird Institute with a monthly donation so that the knowledge and expertise that results from The Baird Institute's research will continue to grow and help to save even more lives.

I congratulate Professor Bannon on being named top researcher in his field earlier this year and thank him and Dr. Sean Lal from my heart, for my heart, which has enabled me to continue to enjoy a healthy lifestyle.

COMMUNITY FUNDRAISING

City to Surf – 14 August 2022

Natalie Zugec and her band of family and friends were back at the City to Surf this year after a 3 year hiatus due to the pandemic. At this event each year, Natalie and her team always manage to raise in excess of \$2,000 for The Baird Institute in memory of her husband, James Wadland who died of an aortic dissection at the age of 35.

If you have a community fundraising idea, we would love to hear from you. Email Catherine at catherine@bairdinstitute.org.au or call 02 9550 2350



Vale

Our thoughts are with the families of the following generous supporters of The Baird Institute who have passed away in the last year. Wishing you all strength and peace at this difficult time

- Neil & Maureen Jackson - parents of Stephen Jackson
- Ricardo Figueiras - husband of Lourdes Figueiras
- Ronald West - husband of Marvin West
- Barry Sheridan – husband of Beryl Sheridan
- Brian McGaw
- Winsome Sharp



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, however we would particularly like to thank our principal supporters.



Medtronic



Baxter

Season's Greetings



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