



**THE BAIRD
INSTITUTE**
Applied heart & lung surgical research

heart TO HEART

NOVEMBER 2023

THE COLLINS FAMILY DONATES \$20,000 TO THE BAIRD INSTITUTE

John Collins, heart surgery patient and major supporter of The Baird Institute

In May 2003 I suffered a heart attack that took everyone by surprise.

I was 52 years old and had never had a sign. I was fit, having run the previous 15 'City to Surfs' with times around 60 minutes. I ate healthily, have never smoked and there was no history in the family - although there is now!

On that eventful evening my family were arriving for a dinner party, Christine and I were leaving for America the following week. They were all very traumatized to see the paramedics stretchering me out the door wearing an oxygen mask.

Such was the impact, my 3-year-old grandson would not sleep for several days until his Mum brought him up to the hospital to see that Pop was okay.

Nine days later, I was deemed stable enough for the triple bypass operation performed by our very own Chair of **The Baird Institute**, Prof. Paul Bannon. After the operation, he advised Christine that "the operation went very well". She says those reassuring words got her through the forthcoming weeks. Subsequent angiograms have shown very little change to the grafted arteries, confirming that success.

On the 20-year anniversary of my bypass surgery in May 2023, the family were determined to make a contribution to **The Baird Institute**. On each anniversary we make a donation but they wanted to celebrate this milestone - dad/pop still here for another 20 years!

Our family visited **The Baird Institute's** headquarters at the RPA hospital at the invitation of Catherine Rush and Paul Bannon. We saw firsthand the work they, and their staff put into heart and lung research and their determination to improve medical procedures and processes.

The knowledge and the absolute dedication of Paul and his team was something we will never forget; my 2 grandchildren were left just so inspired. This family is so grateful for all this good work and will continue to support **The Baird Institute** including provision in our wills.

We are proud and humbled to have been given the opportunity to make a small contribution to such an important and worthwhile institution.

There can be no greater satisfaction in this world than saving lives and sending the patients home to their loved ones.





A NOTE FROM OUR PATRON

The Hon. Michael Kirby AC CMG

Where There's A Will There's A Way

We are presently living through discouraging and sad times. In earlier generations, Australians received news of distant battlefields by newspapers and letters, taking weeks or months to arrive in our distant country. Then came telegrams, often with news of death or serious injuries. Later, black and white television brought news closer and more quickly.

Now we live in an age where it seems inescapable to live with catastrophes: images brought to us by film, satellite transmissions, computer messages and daily news bulletins. Right now, it is difficult for Australians to escape feelings of depression over the news of deadly conflicts in Ukraine/Russia; Israel/Gaza; and North Korea and so on. Whatever the rights and wrongs of such conflicts, we know in our hearts that men, women and children are suffering. Our feeling of personal inadequacy to stem the suffering can become overwhelming.

The Baird Institute in Sydney also has to cope with inescapable patient disasters and family tragedies. Urgent heroic surgery may come too late. Medication may be inadequate to overcome profound physical weaknesses. The toll of long neglected cardiac conditions may mean that patients do not survive. The doctors and nurses who treat these conditions must internalise the pain. We honour those who work at the cutting edge of healthcare, especially in cancer treatment and serious cardiothoracic conditions. All of us, from our own experience or that of family members, know of the dedication, courage, and determination of all those working in or for The Baird Institute. They deserve our love and thanks.

When I was an undergraduate at the University of Sydney studying law, I came to know Doug Baird. He was a brilliant young medical student. He became a great surgeon who helped to pioneer radical heart surgery in Australia. He performed an early bypass procedure on my mother. Her heart was still beating strongly when another condition brought her life journey to a close. Doug Baird himself died far too young. He left behind the inspiration of his own experience. It is **The Baird Institute**. It attracts brilliant specialists from Australia and overseas, leading surgeons from our country and its region; and scientists who are forever seeking to improve the techniques of cardiothoracic surgery and the benefits of modern medicines and care. In a world of depressing news, the work of The Baird Institute lifts the human spirit. It deserves our praise and support.

In this edition of the Newsletter there are wonderful stories of fellow citizens whose loved ones have been rescued from preventable death by gifted surgeons. Sometimes, the rescue lasts for many years. On other occasions it is briefer. But the blessing of life-giving care for loved ones is especially precious.

I praise the commitment of the Institute to cutting edge investigations aimed at improving techniques of surgery and other care. Dr Robert Hume with his original research into the heart's ability to regenerate and Dr Martin Misfeld pushing forward the boundaries of aortic surgical techniques.

Whereas just now, in other parts of the world, tragically, science and technology have been deployed to cause death and destruction, The Baird Institute is constantly pushing the boundaries of surgery to accomplish what was earlier impossible. To save lives of men, women and children; and to produce outcomes that are more successful and less painful than in the past.

When we think of The Baird Institute, Prof Paul Bannon and his wonderful team, we can overcome, at least for a time, the feeling of depression with current world events. Ultimately the spirit of humanity is unconquerable. We, who are its beneficiaries, must dig in our pockets to support The Baird Institute and to signal that our better angels will ultimately prevail. So, this is a good news story. It is up to us to sustain it. Where there's a will, there's a way!

Patron, The Baird Institute

COMMUNITY FUNDRAISING

City 2 Surf – 13 August 2023

Natalie Zugec and her band of family and friends were back at the City 2 Surf this year once again on the 10th anniversary of James' passing. 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





Dear Valued Supporters

I am delighted to bring you the latest edition of "Heart to Heart", our biannual newsletter. It's hard to believe that 2023 is drawing to a close.

Within these pages, you'll find exciting updates and stories that highlight the incredible impact of your support. In particular, I'm thrilled to share some remarkable developments that have taken place.

Dr. Robert Hume, based in our **Centre for Heart Failure & Diseases of the Aorta**, has secured a prestigious Vanguard research grant award. He will join forces with world-renowned biomaterials engineer Professor Tony Weiss to synthesize and test cutting-edge blood vessel replacements. It's worth noting that in 2020, the American Heart Association reported 150,000 global deaths attributed to aortic aneurysms, marking a 26% increase from 2010. This stark statistic underscores the critical nature of The Baird Institute's research in this field.

Professors Bannon, Lal, and O'Sullivan are at the forefront of a groundbreaking endeavour – the **world's first clinical trial** targeting the cardiac energy system. Their mission is to discover innovative ways to empower failing hearts to generate energy, offering hope to thousands of individuals battling heart failure.

In this edition, we're also privileged to share two heartfelt stories. One is from John Collins, a dedicated supporter who, out of profound gratitude, made a generous contribution of \$20,000 to The Baird Institute. John shares his family's motivations for this act of kindness within these pages.

The second story comes from Penny Willis, who graciously recounts her late husband Barry's journey – a story that encompasses hospitalization, surgeries, loss, and the generosity that followed. While parts of this story may be emotionally challenging, Penny's courage in sharing it is truly inspiring and I extend my appreciation to her for her openness.

As we approach the holiday season, I want to extend my warmest wishes to you and your families. May your holidays be filled with joy and your new year, 2024, be one of health and happiness. Your unwavering support has been instrumental in our progress, and we are truly grateful for your commitment to our cause.

With heartfelt appreciation,

Catherine Rush

Catherine Rush
CEO, The Baird Institute



RESEARCH PROJECT - OUTCOMES OF CORONARY ARTERY BYPASS SURGERY IN ELDERLY PATIENTS

Dr. Nicholas McNamara, Baird Institute Grant Recipient and Cardiothoracic Registrar

The Australian population is rapidly ageing, and the number of patients aged 80 years and older presenting for coronary artery bypass surgery (CABG) is expected to increase. Studies investigating the outcomes of CABG in elderly patients are generally from single centres (eg. a particular hospital) and limited by small numbers and a lack of long-term follow up.

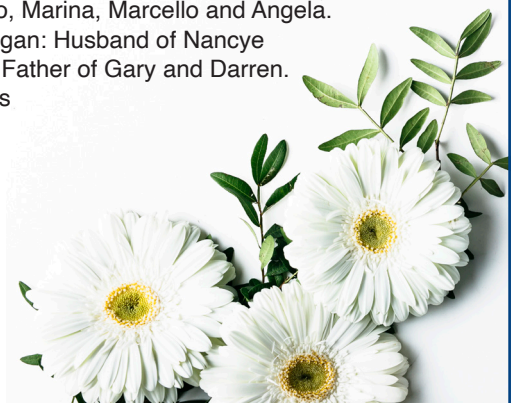
Our study aims to overcome these limitations by utilising the Australian and New Zealand Society of Cardiac and Thoracic Surgeons (ANZSCTS) database to investigate the postoperative outcomes in this cohort of patients. The ANZSCTS database is a binational database that captures operative and postoperative data for all patients undergoing cardiac surgery in Australia and New Zealand.

The database currently collates data from 56 participating sites and will provide a large sample size to permit robust data analysis. This analysis of short and medium-term outcomes will be supplemented via linkage with the National Death Index to examine long-term survival. The overarching aim of this analysis is to explore the impact of cardiac surgery on octogenarians in both the short and long-term, and to identify risk factors that can assist with surgical risk stratification.

Vale

Our thoughts are with the families of the following generous supporters of The Baird Institute who have passed away in the last 6 months. Wishing you all strength and peace at this difficult time.

- Joan Scott: Wife of Jim (deceased), mother of Anne, Lesley and Judy.
- David Cordingley - Husband of Anne and father of Sarah, Nick and Clare.
- Giovanni Cerasani - Husband of Gesuina and father of Secondino, Marina, Marcello and Angela.
- Brian McGuigan: Husband of Nancye (deceased). Father of Gary and Darren.
- Barry Francis





Barry's Story

Penny Willis

Barry Willis was my dearly loved and loving husband, and a wonderful father, grandfather and loyal friend who worked as a research and development chemist, displaying the most amazing engineering and handyman skills. He was a tall, slim, active, fit, healthy living, caring, considerate, kind, patient, thoughtful and witty man, who greatly enjoyed life and all that it had to offer. He suffered from migraines for over thirty years for which he took preventative medication, and in 2007 was diagnosed with peripheral neuropathy, with no cause determined after exhaustive testing. Following a CT scan in 2012, Barry had been told that he had a "tortuous" aorta, but there was no indication that this was a concern.

It was therefore a great shock when on 30th March 2015, Barry, then aged 65 years, complained of sudden, ripping chest pain and dizziness and was taken to Concord General Repatriation Hospital. A heart attack was ruled out within hours. A member of the medical team "inexplicably cancelled" a CT scan planned for Tuesday 31st, leaving Barry to continue suffering relentless pain for close to 75 hours, until he finally underwent two CT scans five hours apart on Thursday 2nd April which diagnosed his condition as being not only a B dissection in his descending aorta, but also an Acute Type A aortic dissection. He was then rushed to Royal Prince Alfred Hospital (RPAH) for emergency surgery where he was met by one of the specialist **Baird Institute** surgeons who informed him that he would die unless he underwent surgery.

The following morning, Good Friday, 3rd April, following the operation which involved heart valve replacement and dacron grafting of Barry's ascending aorta, the surgical team met with me and our children and informed us that in addition to Barry's operation being a very long and difficult one, they believed that he had a genetic connective tissue disorder, Familial Thoracic Aortic Aneurysm and Dissection (Familial TAAD). It was recommended that Barry's siblings and all children have their aortas checked. Both of Barry's brothers were subsequently found to have aneurysms measuring up to 5 cms in their ascending aortas and their health continues to be monitored. The surgeons further explained it was "touch and go" as to whether Barry would survive and the next 24 hours would be crucial. Barry's operation was complicated by bleeding and the surgeons had opted to

delay chest closure until the bleeding was controlled. Over the next two days, Barry was in an induced coma, while our family waited to see if he would survive. The bleeding slowed during this period, and on Sunday 5th April, Barry was returned to theatre for the chest closure procedure. After the surgery, Barry gradually regained consciousness and commenced his long road to recovery. After leaving RPAH in mid-April, he spent nine days in Royal Rehabilitation Hospital at Ryde before finally coming home 27 days after his dissection. We called him "Miracle Man". He felt so lucky to be alive and he considered every day to be a gift. He very persistently and determinedly worked hard to regain his health and strength.

Over the next two years, Barry was closely monitored by his surgeons and his cardiologist, Professor Richmond Jeremy. Regular CT scans to monitor aortic dilation were always a major source of anxiety since we had been told that it was very likely that Barry would require further repair surgery in the future, as the surgeons had done the best they could in the aortic repair surgery under very difficult circumstances, especially in view of the four day delay in diagnosis. Barry also had a number of other health issues, necessitating regular visits to the GP and other specialists.

As Barry's wife and carer, I took over the lawn mowing, gardening and lifting tasks, and did all I that I could to look after him in order to keep him alive. For the first year after his dissection, I continually felt we were living with a ticking time bomb. It was always in the back of our minds, which made it hard to relax and enjoy life.



We gradually resumed our former activities and interests, with Barry back researching and doing his much-loved handyman tasks, and me teaching and volunteering in the community. We also resumed our weekly 25 km bike rides and we walked daily. We enjoyed some short holidays and day outings, although long distance and overseas travel was now totally out of the question. We also had many opportunities to enjoy time with our children, grandchildren, extended family and friends, time together which we always treasured.

Unfortunately, a CT scan conducted in March 2017 revealed that Barry's aorta was measuring 6.0 cms in parts, and following consultation with Professor Jeremy and the Baird specialist surgeons, Barry was strongly advised to undergo further major repair surgery involving the replacement of his aortic arch and the insertion of a frozen elephant trunk prosthesis, as he was now at great risk of rupture and certain death.

Not looking forward to it but having researched in depth the procedure which we were informed had an 85 - 90% chance of success, Barry was admitted, ever hopeful, to RPAH on 8th August. On Wednesday 9th, he underwent a 12-hour long operation performed by the specialist Baird Institute surgical team, which he miraculously survived. Unfortunately, Barry had to be returned to theatre early the next morning for chest re-opening due to bleeding complications. He remained in an induced coma for another nine days due to problems controlling the bleeding, chest reclosure, clots and infections. In addition, we were told that he had suffered a small sub-arachnoid brain haemorrhage. On the 20th of August, following the tracheostomy operation, Barry regained consciousness and for the next 19 days, he courageously fought further complications and eventually weaned himself off the ventilator. It was a very traumatic, challenging and worrying time for us all.

Sadly, there were to be no more miracles.

On Friday evening 8th September 2017, Barry's 32nd day in Cardiac Intensive Care, shortly after I had said good night and told him that I loved him, he suffered a catastrophic subdural brain haemorrhage, thought to be caused by a clot in his venous sinuses pressing on his brain. Barry had completed an Advanced Health Care Plan, also indicating his wishes as a registered organ donor. Barry spent two days on a breathing machine, and following declaration of brain death, one of his kidneys was retrieved and later transplanted into a recipient who had been on dialysis for two years. It is a small comfort to our family to know that Barry lives on in someone else, as well as in our hearts and memories.

Following his dissection, Barry and I became donors to The Baird Institute, as we and our family were so grateful to Professor Jeremy and the specialist Baird Institute surgeons for their caring monitoring, skills and knowledge to prolong his life, which enabled me and our family to have Barry in our lives for another 29 months after his dissection.

I miss Barry every day, and since his death, I have done my utmost to raise awareness in the community of the symptoms of aortic dissection and the importance of early diagnosis and intervention. In addition, I have continued to financially support The Baird Institute and its wonderful work in research, development and training (causes very close to Barry's heart - pardon the pun) as a Partner in Research, making donations to their appeals and including provision of a bequest to the Institute in my will.

I feel immensely excited and hopeful about the current research being undertaken by The Baird Institute, as I consider it has the potential to save many more lives, thus allowing families more precious time with their loved ones.

RESEARCH UPDATE



Dr. Robert Hume PhD, Senior Postdoctoral Fellow,

The Rob Bird Aortic Research Program, Centre for Heart Failure and Diseases of the Aorta.



I have been researching now with the kind support of **The Baird Institute** for just over a year and have sincerely enjoyed my time thus far. As microscopic analyses are my forte, I have been helping across multiple research projects by imaging cardiac tissue at high magnifications using specific fluorescent markers, as well as performing complex 3-dimensional imaging techniques. This has allowed

me to identify the presence of different proteins in both diseased and healthy heart tissue. Furthermore, it has allowed us to discover new insight into the heart's ability to regenerate and repair itself following a heart attack (aka myocardial infarction). With multiple publications on the precipice of submission to highly respected scientific journals, we hope to share our findings in more detail with you all soon!

Another exciting project I am working on currently involves keeping slices of fresh human heart tissue alive and beating! For this project, Baird associated surgeons perform surgery to remove excess tissue from patients with overgrown hearts (hypertrophic obstructive cardiomyopathy). This unwanted tissue is then transported to the lab, sliced, and kept in an incubator with special equipment that periodically electrically stimulates the tissue. This new equipment allows us to analyse the tissues' ability to contract over time and allows us to test exciting new therapeutics for the treatment of heart failure.

All research requires funding to get started. This is why I am excited to announce that a third project, involving the development of flexible biodegradable blood vessel replacements, has received a prestigious Vanguard research grant award from the Heart Foundation. Starting in 2024, in collaboration with a world-leading biomaterials engineer Professor Tony Weiss, we will be synthesising and testing cutting-edge blood vessel replacements. Currently, synthetic materials used to replace smaller vessels are too rigid and prone to blockages. Using naturally derived elastic proteins interwoven into a biodegradable polymer, our vessels will be flexible, resistant to blockages and will undergo slow natural degradation, whilst simultaneously encouraging the body to slowly repair itself. In short, these biodegradable replacements aim to substitute damaged vessels, degrade and form new healthy vessel tissue. This research could help the millions of patients who suffer from diseased or damaged vessels, allowing them to rebuild their own vessels with the help of our biodegradable replacement.

I would like to thank all the wonderful supporters of **The Baird Institute** for helping us undertake such exciting and groundbreaking research.

2023 - THE YEAR IN REVIEW

Professor Paul Bannon Chair, the Baird Institute

Vision Cardiac Surgery Clinical Trial

We are proud to announce the successful completion of the Vision Cardiac Surgery Trial and publication of the first paper in the prestigious ***New England Journal of Medicine***. This important multi-centre trial, with RPAH being one of the international contributors and conducted in collaboration with The Baird Institute, has shed light on the significance of biomarkers or blood tests following major surgery. These provide vital insights into patient survival. By correlating new biomarkers in the perioperative period with patient outcomes, we are taking the first steps to designing ways to minimizing surgical-related injuries.

CardioNAD Clinical Trial

Led by Professor John O'Sullivan, the CardioNAD Clinical Trial has recently received ethics approval and is set to commence soon. This innovative trial aims to explore strategies for reducing injury and safeguarding heart function during surgery. Our researchers are investigating novel approaches to enable the heart to generate energy. Professors Bannon, Lal, and O'Sullivan are collaborating on this world-first clinical trial, which includes identifying heart failure patients pre-surgery, administering a novel therapy, and monitoring its effects through heart biopsies post-surgery. We will also assess this novel therapy's impact on heart failure outcomes in patients from multiple hospitals in Sydney. This ambitious undertaking addresses a critical unmet need in the field of cardiac care.

Sydney Heart Bank Expansion

The ***Sydney Heart Bank***, located in our ***Centre for Heart Failure and Diseases of the Aorta***, the world's largest heart biobank, is set to expand its scope to include lung tissue. This exciting development will establish the Sydney Heart and Lung Bank, opening doors to groundbreaking research in lung diseases and lung cancers. The insights gained from our aortic and cardiac tissue studies have underscored the importance of tissue in advancing our understanding of and improving patient outcomes in heart failure, aortic diseases, lung diseases, and lung cancers, ultimately leading to improved patient outcomes.

Valve Design

Dr. Laurencie Brunel's pioneering research in the realm of valve design is gaining significant momentum. Currently in the process of compiling her PhD thesis, she has achieved remarkable success. Every research paper stemming from her doctoral work has been published in high-impact journals. This body of work provides invaluable insights into how heart valves function in tandem with heart muscle. Understanding these interactions is vital for surgical interventions, enabling us to optimize patient outcomes and minimize potential disturbances. This is incredibly important information and new research projects are already in the pipeline to build upon these findings.

Aortic Work

We are thrilled to announce a major achievement in our quest to advance aortic research at the ***Centre for Heart Failure and Diseases of the Aorta***. Dr. Robert Hume, with the support of The Baird Institute, has successfully secured a prestigious "Vanguard" grant. This grant is testament to the groundbreaking work being carried out in our centre. The seed funding or initial support by The Baird Institute for this research, laid the foundation for what has become an enormously important research endeavour. The dedicated team at our centre has embarked on pioneering work to create a brand new synthetically derived artery. These initial iterations represent a significant step towards the development of cutting-edge solutions for aortic health, underscoring the potential to revolutionize treatments and care in this critical area.

While this update provides only a glimpse into our achievements, it demonstrates the remarkable progress we've made this year. We owe this success to your unwavering dedication and support. Your belief in our mission is propelling us toward new horizons and innovative breakthroughs in heart and lung research and for this I say, "thank you".



AORTIC SURGERY

Professor Martin Misfeld
Co-Director of Research, Cardiothoracic
Department, RPAH Senior Consultant,
Heart Centre, Leipzig, Germany

The aorta can be divided into five parts (I-IV). Three of these parts (I-III) compose the thoracic aorta: Ascending aorta (incorporating the aortic valve and the origin of the coronary arteries, which supply the heart), aortic arch (giving origin of the vessels to the head and arms), and descending aorta (with origins of the arteries supplying the spinal cord), respectively (Figure 1).

Diseases of the thoracic aorta include arteriosclerotic processes, dilatations (aneurysms), narrowing (stenosis), inflammatory diseases and tears of the inner and mid layer of the aortic wall, causing an acute, incomplete rupture (aortic dissection). An aortic dissection is a life-threatening disease, generally requiring an emergency operation. In contrast to atherosclerotic processes and/or aneurysmal disease, which are often without any clinical symptoms, patients with an acute aortic dissection typically describe a sudden onset of a sharp pain between the shoulder blades.

Any kind of sudden onset of chest pain requires urgent medical attention!

Tremendous progress has been made in the treatment of diseases of the thoracic aorta. Based on extensive scientific and research work, surgical procedures today are safe and can be performed as less invasive operations for patients. **The Baird Institute is involved in comprehensive basic laboratory and clinical research work, addressing all kinds of aortic surgery.**

Surgical principles of aortic surgery consist of replacement of the diseased aorta using a vascular prosthesis. Vascular prostheses basically last forever and are well adopted by the human body without rejection. The operations are performed using the heart-lung-machine and specific protection strategies for the heart, the brain and all other organs. Part of these protection strategies include specific solutions to protect the heart (cardioplegic solution), continuous perfusion of the brain and protection of all organs by cooling the patients on the heart-lung-machine.

Figure 2 depicts some examples of replacements of parts of the thoracic aorta. These include:

A) SUPRACOMMISSURAL REPLACEMENT: The ascending aorta is replaced with a vascular graft of appropriate size from above the aortic valve to the aortic arch.

B) HEMIARCH REPLACEMENT: The ascending aorta and parts of the aortic arch (hemiarach) are replaced.

C) TOTAL ARCH REPLACEMENT: The ascending aorta and the complete aortic arch are replaced with a vascular graft.

D) TRIFURCATED GRAFT: The ascending aorta and parts of the aortic arch are replaced. The vessels supplying the head and arms are connected to the aortic graft using a specially designed vascular graft (trifurcated graft).

E) FROZEN ELEPHANT TRUNK: Almost the whole thoracic aorta is replaced with a so-called hybrid prosthesis. This prosthesis consists of a conventional vascular graft (for the ascending aorta and the aortic arch) and a stent graft for the descending aorta. This special hybrid prosthesis is also called "frozen elephant trunk", as the original vascular graft, loosely hanging into the descending aorta ("elephant trunk" procedure described by Prof. H. Borst, Hannover Medical School, Germany in 1983), is now replaced by a rigid stent graft (the "frozen elephant trunk").

It is of importance to note that each surgical procedure is individualized to the patient. This incorporates the design and size of the prostheses used as well as the surgical strategy ie. how much of the aorta has to be replaced, where to connect the heart-lung-machine to the patient, which temperature used, etc.

With today's modern and innovative surgical techniques, even complex aortic surgery can be performed with a low operative risk.

Figure 1.

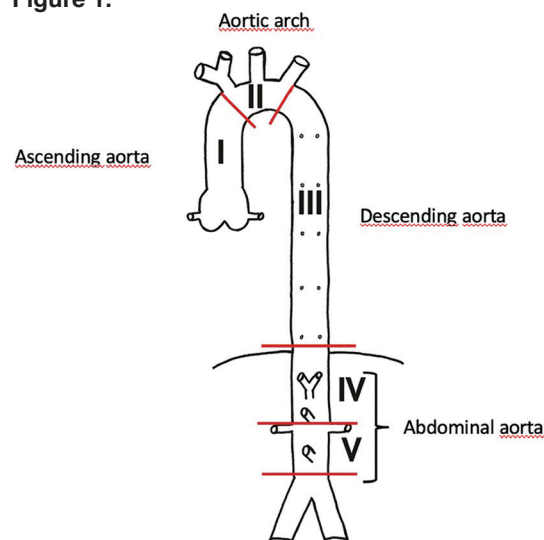
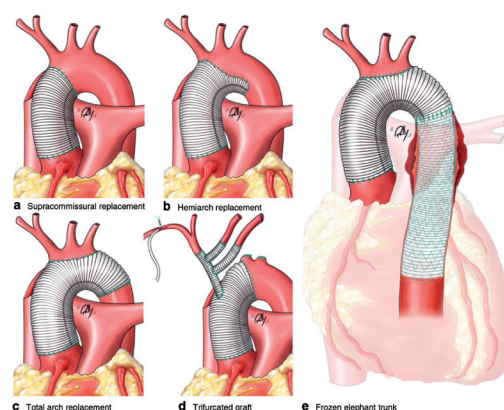


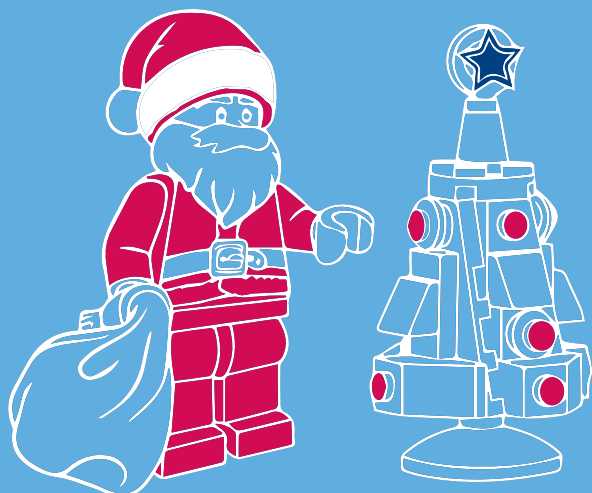
Figure 2



(from T. Krüger et al., British J Surg 2012;99:1331)

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.



Happy HOLIDAYS

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