Contents

CEO’s Report 5
Chairman’s Report 6
Our Board 7
About Us 8
Partners in Research 9
Media 10
Our Research 11
Epilepsy 12
Hearing Therapeutics 16
Infant Hearing 20
Inflammatory Bowel Disease 24
Parkinson’s Disease 28
Investing in Our Future 32
Our Supporters 33
Building and Fostering Donor Relationships 34
Our Supporters are Our Lifeblood 35
A History of Support 36
Support Us 37
Financials 38
Vale Michael Robinson AO 39

Year at a Glance

15 conferences attended
37 peer-reviewed journal articles
41 seminars held
7 patents filed
1 granted patent
48 research students
5 news stories on TV
34% increase in revenue
14 new grants
I am extremely proud to be leading a group of world renowned scientists, engineers, and clinical researchers – who are all focussed on developing medical bionic devices that are translating extraordinary research into clinical products that transform people’s lives.

We now have over 100 staff and students working together to pioneer new technologies that address the unmet needs of patients living with deafness, Parkinson’s disease, epilepsy, inflammatory bowel disease, and more. Bringing together people with a wide variety of skills and our close collaborations with eminent clinicians are crucial to our many achievements, some of which are highlighted in this report.

We are excited to be in the final stages of development of our seizure monitoring device, called Minder™. During the past year, we have worked with neurologist Professor Mark Cook from St Vincent’s Hospital Melbourne, colleagues from the University of Melbourne, and Cochlear Ltd, to finalise the design and safety studies in preparation for a clinical trial in late 2019.

In the area of Parkinson’s disease, we continue to research better treatments and diagnoses, working in collaboration with neurologist Dr Wesley Thevathasan and neurosurgeon Mr Kristian Bulluss. Together we have made significant advancements in improving deep brain stimulation therapy for this condition, which we plan to implement in clinical studies in the coming year.

A world-first bionic solution to treat inflammatory bowel disease (IBD) was also a highlight for the Institute over the past year, working in collaboration with Dr Peter De Cruz, a leading gastroenterologist from the Austin Hospital, and scientists at the Florey Institute led by Professor John Furness. This implantable device is being finalised in preparation for a first-in-human trial towards the end of 2019, and will be the first of its type capable of reducing gut inflammation through therapeutic electrical stimulation.

We are also very pleased with advancements in two of our hearing research programs. Our team have rapidly progressed development of the EarGenie™ system, designed to improve clinical outcomes in babies with hearing loss. The Institute’s development of a nanotechnology-based treatment for hearing loss is being carried out in collaboration with Dr Sherryl Wagstaff from Epworth Eastern Hospital and colleagues from the University of Melbourne. This research is at an exciting stage as we are close to completing the first phase of preclinical testing in preparation for a clinical trial in the next few years.

Securing funding is of course essential to all our work, and this is always a challenge in a highly competitive environment. In the past year, we were therefore very pleased that our researchers received 14 new grants, both from government and philanthropic agencies. We gratefully acknowledge the funding we receive from the Victorian Government from its Operational Infrastructure Support Program, and the Federal Government through its National Health and Medical Research Council grant schemes and infrastructure support (IRISS). This funding continues to be vital for enabling our research programs.

On behalf of the Institute, I extend heartfelt thanks to our many supporters including individual donors, and philanthropic Trusts and Foundations. This support is fundamental to our continued growth and aspirations into the future. We regularly open our doors and host tours of the Institute, so please arrange a visit with us so we can show you some of the innovative research and medical devices being developed.

Our work at the Institute would not be possible without the dedication of Institute staff who share the mission to develop and deliver bionic technologies that improve human health. We are extremely proud of the collaborative culture within the Bionics Institute, where researchers, engineers and clinicians work together to deliver tangible outcomes, supported by a dedicated Board and administration team. The Bionics Institute has the expertise and track record to create a new era of bionic devices that will reduce the burden of disease on individuals and transform people’s lives.

We look forward to continued collaborations and success in the coming year.
Chairman’s Report

Four years ago, the Board of the Bionics Institute reviewed the state of Australian innovation. We identified that we have a problem in this country. We are great at research, but in many cases, we don’t turn knowledge into innovation. The Board agreed that the Bionics Institute would become part of the solution to this problem, by translating invention into innovation.

As Chairman of the Bionics Institute, I’m very pleased that we are starting to see the benefits from our strong focus on translating research into medical device technologies to transform patient’s lives. For example, the significant investment in our epilepsy program with our industry and clinical collaborators has allowed us to fast-track this project, culminating in a first-in-human trial scheduled before the end of 2019.

We produce world leading peer-reviewed research, and are also driven by innovation and device development. It is these devices that will make a difference to the lives of patients and create the industries of tomorrow.

As a Board member, it is a great privilege to hear first-hand about the ground-breaking projects and see the researchers’ passion for their work. In the past twelve months the Institute has generated strong interest from international companies, who recognise the quality of our people and our research. These collaborations have allowed the teams to develop their ideas beyond the lab and facilitate clinical and commercial partnerships for many of our research streams, including hearing, vision and neurological disorders.

I have greatly enjoyed working with our CEO, Mr Robert Klupacs, and the leadership team as they position the Institute at the forefront of medical bionics research. I gratefully acknowledge the support of the Board who generously provide their expertise on the Board and sub-committees. The Institute is focussed on our vision of leading the world in the development and translation of innovative bionic health solutions and I encourage you to learn more about our projects in this report.

Mr John Stanhope AM
Chairman
For more than 30 years, we have been creating, designing, evaluating, and improving bionic devices that interface with the human body to restore impaired sensory or other nervous system and bodily functions.

The Bionics Institute is now recognised throughout the world as a centre of excellence in hearing research and bionic device development. It was founded by Professor Graeme Clark, the inventor of the now internationally renowned bionic ear (cochlear implant). Just as Professor Clark changed people’s lives many years ago with the creation of the cochlear implant, our goal is to continue this legacy and invest in research that ensures nerve related diseases or conditions can be treated and overcome.

We are respectful of our founding history, and we have come a long way over the past three decades. Today, Australia’s cochlear implant provides the gift of hearing to over 550,000 people in more than 120 countries1, and our expertise and experience in this field has underpinned our successful expansion into other areas of clinical need.

The Bionics Institute now has over 100 researchers, engineers, technicians and students working closely with clinicians to pioneer new technologies that address the unmet needs of patients living with hearing loss, tinnitus, epilepsy, Parkinson’s disease, balance and movement disorders, stroke, inflammatory bowel disease, and urinary incontinence.

We also develop novel clinical tools to objectively assess treatment effectiveness and improve clinical management of many of these conditions. This work is underpinned by fundamental research aimed at understanding the nervous system’s response to electrical stimulation.

The Institute has a unique set of skills that combine advanced neurological research with leading engineering designs. Our research facilities are housed within St Vincent’s Hospital Melbourne, and we make extensive use of our close proximity with leading researcher-clinicians at this and other major hospitals to ensure that all of our research programs are driven by a clearly identified clinical need.

Our vision is to lead the world in the development and translation of innovative health solutions. We have developed a flexible business model in line with our translational research which includes creating and planning our own commercial pathways for new technologies, and by building strong industry collaborations.

We are single-minded in our approach to investing in medical bionics and innovation to ensure our continued success for the future – a future where our researchers continue to collaborate with Australia’s leading clinicians and strive to translate ideas into medical technologies designed to improve patients’ lives.

Collaboration is key to the ongoing development of innovative technologies at the Institute and is fundamental to our progress. We are very proud of our history of collaboration with some of the world’s leading universities, research institutes, hospitals and commercial entities.

Research collaborators
- ARC Centre of Excellence in Convergent Bio-Nano Science and Technology, Australia
- Centre for Eye Research Australia
- Charité Hospital, Berlin
- Date81
- Florey Institute of Neuroscience and Mental Health
- La Trobe University
- Monash University
- Oxford University
- Swinburne University
- The HEARing CRC
- The University of Melbourne
- The University of New South Wales

Clinical collaborators
- Alfred Health
- Austin Health
- Cabrini Health
- Epworth Healthcare
- Royal Melbourne Hospital
- St Vincent’s Hospital Melbourne
- The Royal Victorian Eye and Ear Hospital
- Taralye

Commercial collaborators
- Bionic Vision Technologies
- Blamey Saunders Hears
- Cochlear Ltd
- Decibel Therapeutics
- Design + Industry
- EpiMinder Pty Ltd
- Hear and Say
- Polytava Pty Ltd
- PT Group Coatings LLC

Networks
- Aikenhead Centre for Medical Discovery
- Association of Australian Medical Research Institutes
- Biomedical Research Victoria
- Convergence Science Network
- Melbourne Academic Centre for Health (MACH)
- Neurosciences Victoria
- Veski
- Victorian Platform Technologies Network (VPTN)
Professor Peter Seligman receives inaugural Bionics Institute Award

We are very proud of Professor Seligman (now mentor-in-residence at the Bionics Institute) who was awarded the 2018 “Bionics Institute Award for Excellence in Medical Device Innovation” on 4 July. Professor Seligman received this award for his significant contribution to the development of cochlear implants. The award also recognized the significant input and mentorship he has provided to the Australian medical device development community over the last 30 years.

Gut-brain-axis the target of implantable device for IBD

The Bionics Institute was featured in the Herald Sun on 9 May 2019 highlighting our invention and development of a small implantable device to manage inflammatory bowel disease (IBD). Lead researcher, Dr Sophie Payne, was interviewed by ABC Adelaide and explained the benefits of a bionic solution to treat inflammatory bowel disease, including how it would alleviate the need for expensive medications.

Giving Parkinson’s the BiRD – a device to diagnose Parkinson’s disease

On 11 April 2019, Dr Thushara Perera was featured on channels 7, 9, and 10 for his work in developing a unique, palm-worn device which could become a major tool for the early diagnosis of Parkinson’s disease. The story also received international exposure.

To measure hearing, listen to your heart

Dr Mehrnaz Shoushtarian was featured in the Herald Sun and several international online publications on 1 March 2019 for her discovery into a link between heart rate and hearing. This finding has significant implications for assessing hearing in infants and young children who are unable to communicate what they hear to their audiologist.

Restoring hearing loss in veterans

On 8 November 2018, the Bionics Institute was featured in the Herald Sun and channels 7, 9, 10 and the ABC for our work developing novel therapeutic approaches to treat hearing loss. The United States Department of Defense recognised the potential impact of this research and awarded the Bionics Institute team a US$1.1M grant. Associate Professor Andrew Wise, the lead researcher on the project, was also on national ABC radio talking about his research.
Epilepsy is diagnosed by observing the electrical activity of the brain by electroencephalography (EEG). However, this is not always a straightforward process, especially since seizures are unpredictable. Conventional EEG recordings are impractical for more than a day or two, may not capture an event, and repeat visits or in-hospital stays are expensive.

For over a decade, we have been developing the concept of a small implant that will allow continuous and long-term recording of brain activity. We were proud to announce in 2018 that we had developed the Minder™ device. It has been designed to reliably monitor seizures outside the clinic and allow patients to go about their daily lives. Importantly, it will provide clinicians with an accurate record of seizures so that a diagnosis can be confirmed and drug therapies can be better tailored to individuals.

Minder™ is the culmination of years of research and development led by neurologist Professor Mark Cook (Director of the Graeme Clark Institute and Chair of Medicine at the University of Melbourne), Associate Professor Chris Williams from the Bionics Institute, colleagues from the University of Melbourne and more recently Cochlear Ltd, one of the world’s leading medical device companies and partner.

Based on successful research and development over the last 12 months we are extremely excited that first-in-human clinical trials are expected to commence before the end of 2019.

During the past year, the team has focussed on finalising the preparations for the first-in-human clinical trial. This included:
- Research and development of the Minder™ system
- Completion of regulatory requirements
- Finalisation of the implant design

Our goals for the coming year are to:
- Commence first-in-human clinical trials before the end of 2019 to validate the safety and efficacy of Minder™ system
- Use the data from the clinical trial to further develop the next generation device

1. Epilepsy Action Australia
Professor Mark Cook
(MBBS, MD)

Professor Mark Cook is a leading neurologist at St Vincent’s Hospital Melbourne, Chair of Medicine at the University of Melbourne, and Director of the Graeme Clark Institute, who has been collaborating with the Bionics Institute epilepsy research team since 2002.

It is estimated that over 250,000 Australians are living with epilepsy, and approximately three percent of people will experience a seizure at some point in their lives. Professor Mark Cook is acutely aware of the major drawbacks of current measures to diagnose patients. At present, a diagnosis of epilepsy is determined from brain activity recordings (EEG) but this is impractical for more than a day or two and often requires in-hospital stays which can be expensive. Furthermore, there are less than fifty epilepsy monitoring beds available in the whole of Australia, making the entire diagnostic process very frustrating for patients and clinicians. Seizures that may be happening infrequently are still very disabling and possibly life threatening. However, it’s hard to capture these events with the systems we have currently, so clinicians such as Professor Cook are often unable to diagnose this condition accurately.

Professor Cook explains that cardiologists have been able to dramatically improve people’s lives with the invention of the implantable loop recorder that allowed clinicians to monitor patients’ heart rhythms over long periods of time. The device was designed to provide real-time insights into heart conditions, and changed this area of medicine forever. Professor Cook and the epilepsy team at the Bionics Institute led by Associate Professor Chris Williams hope to bring the same type of revolution to epilepsy through the invention of the Minder™ device. This device has been designed to accurately monitor brain activity and detect a patient’s seizures outside of a hospital environment, allowing patients to engage in normal everyday activities. The device will also allow for a more tailored approach to managing drug therapies.

"Working with the research team at the Bionics Institute has been a life changing experience for me. Having the opportunity to collaborate with specialists in their respective fields, outside of biological science with expertise in medical technologies and materials, has been pivotal in the development of electric medicine.

The Institute is leading the way in medical bionics research in Australia, in fact the entire world, and has been in this space since the very start. The perspective that the team at the Institute provides is incredibly insightful and radically different. It makes me think about how I look at things in a totally different way. As collaborators we have developed radical new therapies for complex neurological illnesses.

For a long time the Institute has focussed on hearing, but now its reach has extended to many areas of human health, particularly in the area of brain disease. This is the most exciting period of development that I have come across or that I have lived through – it’s the start of a brand new era in medicine."

— PROFESSOR MARK COOK

Image A/Prof Chris Williams and Prof Mark Cook
Hearing Therapeutics

Treating Hearing Loss Via the Delivery of Drugs to the Cochlea

One in six Australians suffer from some degree of hearing loss and by 2050 this will increase to one in four. Although the forecast increased prevalence of hearing loss is largely driven by our ageing population, many people acquire their hearing impairment through noise exposure.

Hearing loss through noise exposure affects people in many walks in life, particularly those working in the military, construction, transport, manufacturing, and live music and entertainment industries. In 2017, the financial cost of hearing loss was estimated to be $15.9 billion. Currently, there are no therapeutic options to treat damage to the inner ear, and impairment is likely to worsen over time. There is a desperate need to develop drug therapies that can treat, and/or reverse hearing loss.

Hearing loss not only impacts our ability to communicate, but is associated with cognitive decline, social isolation, loss of independence and depression. These factors, in turn, increase the risk of developing dementia, and research suggests that people with even mild symptoms of hearing loss are twice as likely to develop dementia as those with healthy hearing. Those with severe hearing loss may be up to five times more likely to develop dementia.

Our team of researchers, led by Associate Professor Andrew Wise in collaboration with chemical engineers at the University of Melbourne and ENT Specialist Dr Sherryl Wagstaff from Epworth Healthcare, are developing a novel technology that we believe will be a game changer in the use of drug therapies to treat inner ear damage. The technology is based on a unique method of delivery that ‘loads’ the drug into tiny particles (nanoparticles) created through nano-engineering. This medical breakthrough will enable the delivery of drugs to the hard-to-reach inner ear, at levels that are safe and effective.

Our results so far are very promising and the team is focused on generating the data needed to initiate a clinical trial within the next few years.

During the past year, the team has focussed on:
— Developing new technology to improve the drug delivery system
— Testing the drug delivery capabilities of the technology
— Developing the surgical techniques required for clinical translation

Our goals for the coming year are to:
— Test the safety and efficacy of the drug delivery system for treating hearing impairment
— Continue to develop scalable manufacturing processes
— Work towards a first-in-human clinical trial

1. Australian Access Economics
2. Hearing Care Industry Association
3. Dementia Australia
Dr Sherryl Wagstaff
(MBBS, FRACS, MBA
(MBS), GAICD)

Dr Sherryl Wagstaff is an ear-nose-and-throat (ENT) specialist and Medical Director at Epworth Eastern Hospital who has been collaborating with the Bionics Institute hearing therapeutics team for the past two years.

As an otolaryngologist, Dr Wagstaff has seen thousands of patients experience hearing loss. From her clinical experience, everyone will acquire some degree of hearing loss as they get older, but to what extent depends on various factors. Hearing loss is often first noticed when people struggle with hearing in crowded environments, known as ‘cocktail party syndrome’. This is generally characterised by people simply nodding in response to questions they are unable to hear. Her patients tell her that they find it easier to nod than to risk answering a question incorrectly and look silly. Over time hearing loss can make people feel unintelligent and overwhelmed and, as a result, many patients simply withdraw from society. As a clinician who wants to make a difference, this has made Dr Wagstaff feel quite hopeless at times.

The Institute’s hearing therapeutics research team, led by Associate Professor Andrew Wise and Dr Wagstaff, are working on the development of a novel technology that may be able to stop the progression of hearing loss, and even improve the hearing loss that has already occurred. The technology uses nano-engineering to create tiny particles that can slowly deliver therapeutic agents into the inner ear in a safe and effective way.

In the past, Dr Wagstaff has told her patients that the idea of a drug that could assist with hearing loss would never happen in their lifetime. After collaborating with the Institute, she is now filled with a sense of confidence that one day soon she will have a hearing loss treatment to offer her patients that will provide life-changing benefits. This has provided Dr Wagstaff with a great deal of inspiration for both herself and her patients. She has a sense of satisfaction that the collaboration with the Institute has been instrumental in an incredible advancement in hearing impairment research.

“I have felt that my interactions with the Institute’s scientists are mutually beneficial. I don’t think that one can live without the other anymore. Australia has both world-class scientists and world-class clinicians. It is time that we recognize that the interaction between the two groups is the only way to progress science at a speed that makes it relevant to patients. Success is no longer about journal articles and citations; it is about touching patients to enhance their lives forever.”

— Dr Sherryl Wagstaff
Over 8,000 Australian babies and young children under the age of five have permanent hearing loss, which can severely impair language development with life-long impacts on their education, social and mental health, and employment opportunities.1

Early access to hearing is crucial for the development of brain networks involved in language development and perception, and this is the reason why infants as young as two months old are receiving hearing aids and cochlear implants. Whilst the introduction of newborn hearing tests in 2000 and early adoption of hearing devices have improved outcomes for hearing-impaired babies, there is still great variability in their language development. Some children develop well with their hearing devices, but others are left behind.

At present there is no way to determine if a baby with hearing difficulties using either a hearing aid or cochlear implant is developing the most optimal language pathways in their brain.

Professor Colette McKay is leading the team developing an innovative clinical system called EarGenie™ which uses functional near-infrared spectroscopy (fNIRS) to image brain activity. At diagnosis, EarGenie™ can provide an accurate and detailed hearing assessment so that appropriate hearing devices can be confidently selected and fitted. Over time, this system can be used to evaluate and fine tune devices to optimise each child’s hearing and monitor their language development.

This non-invasive method of mapping brain activity uses light sources and detectors within a head-cap and, unlike existing imaging techniques, is child-friendly, portable, low cost, non-invasive, and compatible with implanted devices such as cochlear implants. Research at our purpose-built BabiLab (Behavioural and Brain Imaging Laboratory) has already shown that INIRS is effective in showing speech-related brain activation in infants (even whilst asleep), and is able to estimate hearing thresholds.

During the past year, the team has focused on:

— Research and development of the EarGenie™ system
— Developing a clinical test of speech sound discrimination in babies which will assist clinicians to know when hearing aids or cochlear implants need adjustment

Our goals for the coming year are to:

— Commence use of a prototype system in clinics
— Develop a new hearing level assessment test using a combination of INIRS and EEG which will be incorporated into the prototype for clinical testing
Dr Julia Wunderlich is a Senior Audiologist at Monash Health and a Senior Clinical Research Fellow at the Bionics Institute.

Dr Wunderlich has been collaborating with the Bionics Institute since 2018, working closely with Professor Colette McKay and the EarGenie™ team. With a PhD in auditory system development and nearly 35 years’ experience as a paediatric audiologist, Dr Wunderlich is assisting in the development of a new clinical system to address some of the most difficult clinical issues facing hearing-impaired children.

Currently, 10 percent of babies born with a hearing loss will be diagnosed with auditory neuropathy. In this condition, part of the cochlea functions normally but transmission of sound information to the brain is disordered and speech perception is compromised. Current clinical audiology tools work well in other forms of hearing impairment, but do not provide accurate measurement of a baby’s hearing ability when they have auditory neuropathy.

As an audiologist Dr Wunderlich wants to be in a position to provide definitive answers about what a baby can and cannot hear. She needs a diagnostic tool that allows her to provide answers as early as possible so that she can prescribe hearing devices and get early intervention started. The last thing Dr Wunderlich wants is to tell a family that it could be many months before she can provide any certainty about the hearing ability of their baby.

EarGenie™ holds great promise as a new clinical tool, allowing accurate measurement of the hearing ability in all babies including those with auditory neuropathy. It measures changes in blood oxygen levels occurring in a baby’s brain using a technique called functional near-infrared spectroscopy (fNIRS). Dr Wunderlich feels very privileged to be part of this innovative development team. EarGenie™ is using a technique never used before in audiology and she can’t wait to get it into the clinic to help her most vulnerable families.

“The Bionics Institute is a place where basic science is translated into real-world solutions. It’s a place where scientists and clinicians bring together years of experience and their amazing talents to solve clinical problems. I love that focus, of bringing new solutions and ideas to problems. That focus and depth of knowledge enriches my clinical practice as well - it is just magic! One of the most exciting things about working on the Bionics Institute’s EarGenie project is the prospect of having a new diagnostic tool to put into clinical practice.”

— DR JULIA WUNDERLICH
In Australia, IBD is becoming more prevalent, more complex, and more severe. It affects approximately one in 250 people aged between five and 49. More than 80,000 Australians live with this condition, with this number projected to increase to 100,000 by 2022. Healthcare utilisation and costs are also increasing, including direct costs resulting from hospitalisation.

IBD involves periods of ‘relapse’ when the inflammation in the bowel flares up, and periods of ‘remission’ when the inflammation calms down. The aim of treatment is to manage relapses when they occur and give the bowel a chance to heal. Medications, which are expensive, are used to help maintain remission, improve general wellbeing, and prevent complications from developing; however, there is an urgent need for more effective treatments to control the inflammation that causes intermittent bouts of severe abdominal pain, diarrhoea, and fever.

Bionics Institute researchers Associate Professor James Fallon, Professor Rob Shepherd and Dr Sophie Payne are collaborating with Dr Peter De Cruz, a leading gastroenterologist from Austin Health. They have developed a small, implantable medical device to manage IBD. This world first device applies electrical stimulation to the abdominal branch of the vagus nerve – a major nerve that connects the brain to the gut – and once activated reduces inflammation in the gut.

During the past year, the team has focussed on finalising the preparations for a first-in-human clinical trial. This included:
- Demonstration of efficacy of stimulation in a preclinical model
- Finalisation of the implant design and surgical approach
- Manufacture of devices and completion of regulatory requirements

Our goals for the coming year are to:
- Commence first-in-human clinical trials late 2019
- Use the knowledge gained from clinical data to inform future development of the device

Image: The Bionics Institute Inflammatory Bowel Disease Research Team (L-R) Dr Tomoko Hyakumura, Dr Sophie Payne, Ross Thomas, A/Prof James Fallon, Dr Peter De Cruz
Dr Peter De Cruz
(MBBS, PhD, FRACP)

Dr Peter De Cruz is one of Australia’s leading inflammatory bowel disease (IBD) specialists; he is the Director of the IBD service at the Austin Hospital and a Senior lecturer at the University of Melbourne. Dr De Cruz has been collaborating with the Bionics Institute for four years.

Almost 80,000 Australians live with IBD, including Crohn’s disease, with this number projected to increase to 100,000 by 2022. Up to 80 percent of patients with Crohn’s disease require surgery at some point in their lives. Surgery is not a cure and recurrence is common and occurs in up to 70 percent of patients. Recurrent surgery can have complications and places patients at risk of intestinal failure and the need for a stoma bag.

Dr De Cruz is working in collaboration with the Bionics Institute in a first-in-human clinical trial that is examining whether an implantable bionic device that stimulates a branch of the vagus nerve – a major nerve that connects the brain to the gut – can prevent the recurrence of Crohn’s disease after surgery.

Dr De Cruz has been highly impressed by the depth and breadth of talent within the Institute and is excited about the prospect of turning dreams into reality. The collaboration offers clinicians the chance to use state-of-the-art diagnostic and therapeutic devices that better tailor medical therapies for patients.

"I feel incredibly privileged to be part of such a fantastic team that has taken a proof-of-concept from preclinical research, to a world first-in-human clinical trial to assist Crohn’s disease patients. The Bionics Institute is a unique medical research Institute that promotes cross-disciplinary collaboration involving engineers, bench-side researchers and clinicians to help solve very complex clinical problems. The Institute attracts some of the very best and brightest in their respective fields and has provided an open forum to enable its group of clinicians and multi-disciplinary researchers to work together to address questions of unmet need. The environment has been nurtured and developed to propel the academy of health, science and medical research forward to the limits of the imagination."

— DR PETER DE CRUZ

1. Crohn’s & Colitis Australia
Many patients do not receive adequate relief of their symptoms from pharmaceutical treatments, and for these patients, Deep Brain Stimulation (DBS) is an established therapy. This complex surgical procedure involves implanting a battery-powered device that delivers electrical stimulation to targeted brain regions to help control tremors. Currently, patients must remain awake, and errors in placement can result in unwanted side-effects.

Leading neurologist Dr Wesley Thevathasan from St Vincent’s Hospital Melbourne and the Bionics Institute’s Professor Hugh McDermott and team, have discovered a biomarker in patients receiving DBS implants for the treatment of Parkinson’s disease. This discovery has the potential to revolutionise treatment by improving the targeting of the small brain region to be stimulated. It will also enable surgery while a patient is asleep, and allow for the improved positioning of stimulation.

Another issue with conventional DBS is that it is applied at a constant level which does not respond to patients’ fluctuating symptoms. At times, stimulation can be insufficient or excessive, causing inadequate control of symptoms or side effects. Researchers are developing a next-generation ‘adaptive’ DBS, which will use our recently discovered biomarker to develop personalised therapy that responds to the patient’s symptoms in real time.

Progress is also being made in the development of new technologies to measure tremor and improve diagnosis. Dr Thushara Perera is developing a unique, palm-worn portable device which is designed to be used by a general practitioner as a simple test which can accurately measure rigidity (stiffness), one of the hallmark symptoms of this disease. Early treatment and better disease management will improve quality of life and reduce the burden on Australia’s healthcare system.

During the past year the team has:
- Worked on developing improved electrode arrays and associated software which will assist clinicians in positioning DBS electrodes accurately during surgery.
- Passed a significant milestone in their clinical studies evaluating improved DBS techniques to treat Parkinson’s disease: over 100 patients have now participated in our trials.
- Filed patents in USA, Europe, China and Japan.

Our goals for the coming year are to:
- Extend current clinical studies to other sites that provide DBS therapy for Parkinson’s disease to gain further experience and evidence to underpin our improved techniques.
- Establish a spin-out company for further development and translation of our innovations.
- Partner with one or more major commercial DBS suppliers to facilitate the translation of research outcomes into clinical advances that will directly benefit patients.

Image: The Bionics Institute Parkinson’s Disease Research Team (L–R) Back row: Dr Wesley Thevathasan, Angus Begg, Dr Wee-Lih Lee, Nicholas Sinclair, Dr Joel Villalobos. Front Row: Dr Tomoko Hyakumura, A/Prof James Fallen, Nicola Horvath, Prof Hugh McDermott, Dr San San Xu, Dr Thushara Perera.  

1. Deloitte Access Economics
Dr Wesley Thevathasan is a Consultant Neurologist at The Royal Melbourne, Royal Children’s, Austin and St Vincent’s Hospitals in Melbourne and the Lions International Neurobionics Research Fellow at the Bionics Institute.

Dr Thevathasan has been collaborating with the Bionics Institute for five years in the area of Parkinson’s disease and its treatment through deep brain stimulation (DBS).

DBS has transformed the lives of many people with Parkinson’s disease by reducing movement symptoms such as slowness, gait disturbance and tremor. For this treatment, surgeons need to insert electrodes to stimulate a tiny part of the brain – the size of a coffee bean – and patients need to be awake. At the present time, patients may not receive optimal benefit from this surgery due to a variety of factors such as inaccurate implantation of electrodes, the level of DBS stimulation being determined largely through trial-and-error, and reliance on the experience of clinicians.

As a clinician treating patients living with Parkinson’s disease, Dr Thevathasan frequently observes the limitations of DBS surgery and this is highly motivating for Dr Thevathasan to improve DBS surgery and make the treatment respond better to the needs of individual patients.

In 2018, the Bionics Institute team, led by Professor Hugh McDermott along with Dr Thevathasan, discovered a unique brain signal that could be used to guide and improve the accuracy of implantation of DBS electrodes. The new brain signal will also allow the surgery to be performed without the need for the patient to be awake – a daunting prospect that discourages some patients who could benefit from the therapy. Our discovery has transformed the way neurosurgeons can now perform the DBS procedure, and will underpin an advanced and ‘adaptive’ DBS system that can respond to patients’ changing symptoms.

“The Bionics Institute has provided a world leading framework for clinicians and engineers and business people to work in collaboration, to harness our summed expertise to develop device assisted therapies. I have experience of clinical neurology and research in many areas in the world, and the model that the Bionics Institute has adopted is unique – and demonstrates that incredible things can happen when medical and technical experts from different areas collaborate with a shared mission.”

— DR WES THEVATHASAN

Image Dr Wesley Thevathasan and Prof Hugh McDermott
Students are integral to research success at the Bionics Institute. These high-calibre young scientists have a passion for research, and demonstrate initiative, independence and inventiveness. We aspire to create an environment in which our students can cultivate their skills with guidance from dedicated supervisors who are world-class researchers. We are proud of our students and what they achieve. Two of our students describe their research and experience as a Bionics Institute student.

Balance evaluation in Parkinson’s disease.

— MS Joy Tan

"Decreased balance and an increase in falls are common in later stages of Parkinson’s disease. However, changes to balance are known to occur early, before abnormalities are identified by clinicians. To measure balance more precisely, we developed an instrumented version of the clinical pull-test. Not only can this help infants access sound, it facilitates routine implant adjustment procedures in adults by saving clinicians’ time and effort. My team’s work has seen translation to a patent, and it is my hope that one day, this technology will be implemented into a clinical device that benefits cochlear implant recipients.

My team and I have developed a novel method that can automatically set the electrical levels for cochlear implants from the push of a button and without clinician supervision. Not only can this help infants access sound, it facilitates routine implant adjustment procedures in adults by saving clinicians’ time and effort. My team’s work has seen translation to a patent, and it is my hope that one day, this technology will be implemented into a clinical device that benefits cochlear implant recipients.

The Bionics Institute has multi-disciplinary expertise along with a great collaborative atmosphere. This allows and promotes engineers, clinicians, researchers and even commercial development experts to exchange their knowledge, an environment that I find myself very excited to be in.”
Building and Fostering Donor Relationships

Support received from philanthropic trusts and foundations is vital to enable our researchers to successfully develop new devices and treatments. At the Bionics Institute, we understand the importance of developing a respectful relationship with our supporters, which often spans over many years.

The John T Reid Charitable Trusts are a national funding organisation that focuses on areas of need within the community. The Trustees identified over 60 years ago the impact hearing loss has on the community. In February 1957, the first grant awarded by the John T Reid Charitable Trusts was to the Royal Victorian Eye and Ear Hospital to assist in deafness research. The Trustees followed the progress of treatments for hearing loss and, in 2005, the John T Reid Charitable Trusts awarded its first grant to the Bionics Institute, a three year project in support of Reversing Deafness using Nerve Growth Factors.

The Trustees followed the progress of this study and other research at the Bionics Institute and, in 2007, became aware of the work being undertaken in bionic eye technology. Funding from the John T Reid Charitable Trusts at this time supported the Bionic Eye Biocompatibility and Efficacy Project, a collaboration between the Bionics Institute and the Centre for Eye Research Australia.

Over the following ten years, the Trustees of the John T Reid Charitable Trusts noted the Institute’s success in developing brain stimulation technologies that offer a new approach for a range of debilitating neurological disorders. These technologies are an evolutionary step from the Institute’s development of the bionic ear and the bionic eye.

In 2019, the John T Reid Charitable Trusts have generously approved funding towards the clinical trial of a new medical device to revolutionise epilepsy diagnosis and treatment. The Bionics Institute is extremely grateful for the support from the John T Reid Charitable Trusts over the past 14 years. This is just one story of many that shows how a long term relationship with a philanthropic trust provides vital funding for the work the Bionics Institute does. The Institute remains committed to keeping our supporters engaged and informed about the latest developments from our researchers, working closely with clinicians, patients and community groups to ensure that our research is translated into tangible solutions for those who need it most.

Our Supporters are Our Lifeblood

Bionics Institute Ambassador, Suzanne de Pelsenaire, has been a generous supporter of the Institute for many years. Suzanne was a recipient of a cochlear implant over ten years ago, and it had such a positive impact on her life, she wanted to give back to the Institute whose founder, Professor Graeme Clark, invented the bionic ear. Initially, Suzanne was involved as a volunteer, and through this involvement, she developed a close relationship with Professor Colette McKay, Leader of our Translational Hearing Research program and Principal Scientist at the Bions Institute.

Suzanne has always been a keen gardener, and was gazing over her beautiful garden a few years back, and was sad to think she was the only one who got to enjoy it. That was a light bulb moment for Suzanne, when she realised she could open her beautiful garden to the public to raise money and awareness for the Bionics Institute.

Money raised from Suzanne’s Open Garden provides funding for the BabiLab at the Bionics Institute, which is Australia’s first brain imaging lab specifically for hearing research, and is spearheading new methods to improve the quality of life for babies and young children who are hearing impaired.

“I am now celebrating 11 years since I myself received the gift of hearing with a cochlear implant, which has transformed my life. My gratitude is boundless – my indebtedness never-ending.”

— SUZANNE DE PELSENAIRE
A History of Support

The Victorian Lions Foundation began their association with the Bionics Institute over 25 years ago. John Mitchell is the Secretary of the Foundation.

John is a pharmacist, who has been associated with the Lions Club of Leopold for many years. In 1986, the Victorian Lions Foundation was formed, with the purpose of coordinating donations to many of the Lions’ charitable projects. John became involved with the Foundation as Secretary in 2002 for three years, rejoining in 2012.

John recalls that when he started as Secretary in 2002, he was shown a letter that the Victorian Lions Foundation had received from Professor Graeme Clark in 1993, advising that government funding for his cochlear implant research was not being extended. Without support, further development of this new bionic device was not going to proceed. The Victorian Lions Foundation had previously been supporters of the (then) Bionic Ear Institute, but at this time, they took a leap of faith and provided a larger donation that proved to be critical and allowed Professor Clark’s research to continue.

The Victorian Lions Foundation is currently funding the Lions International Hearing Research Fellowship and Lions International Neurobionics Research Fellowship. Dr Wes Thevathasan is the first Neurobionics fellow appointed, researching improvements to deep brain stimulation therapy for Parkinson’s disease. John has seen the impact of this work on a fellow pharmacist he referred to Dr Thevathasan.

John’s friend, who had been impacted by the symptoms of Parkinson’s disease, is now back on the golf course, and his quality of life has improved dramatically.

John is interested in all areas of the Institute, and volunteered for the EarGenie™ team in the early stages of their research. The data collected from this pilot study were vital in obtaining funding to progress the EarGenie™ prototype.

“Coming to visit the Bionics Institute is like coming home. It is not just the beautiful building, but the people who work within it.”

— JOHN MITCHELL
SECRETARY, VICTORIAN LIONS FOUNDATION

Support Us

The Bionics Institute is a unique medical research organisation where incredibly talented researchers, engineers and clinicians all work together to create life-changing medical solutions for individuals and the greater community. The Institute has a vision to develop a new era of bionics devices that will reduce the burden of disease on individuals and transform people’s lives.

Please support the work we do by donating today.

Leave a Legacy

A lasting gift is a wonderful and practical way of helping to make a real difference, providing vital funding to our research. By including a bequest in your Will to the Bionics Institute you will help many children and adults enjoy a better quality of life and independence.

Having a Will that is up-to-date provides you with peace of mind knowing that the security of your family and friends has been assured, and it helps loved ones manage and deliver your decisions with ease during a highly emotional and sensitive time. A Will ensures that your assets are distributed the way you want and ensures you can support those causes you were passionate about throughout your life.

A bequest is a simple but powerful way to provide support for the causes that matter the most to you. It transforms your Will into one of the most potent tools for change there is, with little or no impact on your lifestyle today.

If you are considering supporting the Bionics Institute with a bequest, we encourage you to contact us on enquiries@bionicsinstitute.org. We would like to thank you, invite you to visit the Institute and keep you informed of our research progress. Should you wish your bequest to remain anonymous, we will respect this and acknowledge your gift privately.
Abridged Financial Statement for the year ended 30 June 2019

Consolidated Income Statement 2019 ($) 2018 ($)

<table>
<thead>
<tr>
<th>Revenues From Ordinary Activities</th>
<th>2019 ($)</th>
<th>2018 ($)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Federal Government grants</td>
<td>2,208,758</td>
<td>1,711,943</td>
</tr>
<tr>
<td>Victorian Government grants</td>
<td>565,624</td>
<td>517,335</td>
</tr>
<tr>
<td>Foreign grants</td>
<td>1,966,049</td>
<td>1,009,156</td>
</tr>
<tr>
<td>Trusts &amp; foundations</td>
<td>1,480,192</td>
<td>957,090</td>
</tr>
<tr>
<td>Public fundraising</td>
<td>474,389</td>
<td>285,211</td>
</tr>
<tr>
<td>Research contracts</td>
<td>2,387,616</td>
<td>2,000,397</td>
</tr>
<tr>
<td>Investment &amp; interest income</td>
<td>736,962</td>
<td>642,145</td>
</tr>
<tr>
<td>Other income</td>
<td>651,979</td>
<td>713,146</td>
</tr>
<tr>
<td><strong>Total Revenue From Ordinary Activities</strong></td>
<td><strong>10,472,469</strong></td>
<td><strong>7,836,423</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Deficit On Ordinary Activities</th>
<th>2019 ($)</th>
<th>2018 ($)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less Expenditure on ordinary activities</td>
<td>(10,797,008)</td>
<td>(8,826,848)</td>
</tr>
<tr>
<td><strong>Deficit</strong></td>
<td>(324,539)</td>
<td>(990,425)</td>
</tr>
</tbody>
</table>

2019

- Government funding: 10%
- Private funding: 26%
- Foreign funding: 22%
- Research contracts: 18%
- Other income: 18%
- Institute funding: 6%

2018

- Government funding: 19%
- Private funding: 25%
- Foreign funding: 14%
- Research contracts: 11%
- Other income: 23%
- Institute funding: 8%

Consolidated Statement Of Financial Position 2019 ($) 2018 ($)

<table>
<thead>
<tr>
<th>Current Assets</th>
<th>2019 ($)</th>
<th>2018 ($)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non-Current Assets</td>
<td>5,930,256</td>
<td>5,749,207</td>
</tr>
<tr>
<td><strong>Total Assets</strong></td>
<td><strong>13,712,379</strong></td>
<td><strong>13,134,133</strong></td>
</tr>
<tr>
<td>Current Liabilities</td>
<td>19,642,634</td>
<td>18,893,340</td>
</tr>
<tr>
<td>Non-Current Liabilities</td>
<td>5,668,343</td>
<td>4,759,472</td>
</tr>
<tr>
<td><strong>Total Liabilities</strong></td>
<td><strong>15,310,977</strong></td>
<td><strong>13,652,812</strong></td>
</tr>
<tr>
<td>Net Assets</td>
<td>5,768,506</td>
<td>5,130,189</td>
</tr>
<tr>
<td>Total Institute Funds</td>
<td>13,874,128</td>
<td>13,753,151</td>
</tr>
</tbody>
</table>

The community of the Bionics Institute, along with the extended networks of the Bionic Ear Institute (1986-2011), were saddened to learn of the passing of Michael Bennett Robinson AO who died in March 2019 after a period of illness.

We pay tribute to Michael who joined the Bionic Ear Institute Board in 1993 and was appointed Chairman in 1998. Michael, who retired from the Board in 2003, always thought the organisation was a very special place with inspiring people dedicated to making lives better.

His tireless efforts helped transition the Institute physically and financially during its establishment phase towards the dynamic research organisation it is today. Michael’s contribution to Australia was recognised in 2001 when he was made an Officer of the Order of Australia.

The Institute acknowledges Michael’s service and legacy with gratitude.

Full audited financial statements are available from the Institutes registered office by request.
The Bionics Institute is a world-leading centre of medical bionics device development.

We bring together clinicians, engineers and researchers, focussed on developing medical bionic devices and therapies to transform people’s lives.