

IHBI ADVANCES

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Balance and mobility benefit from Parkinson's patients' dance moves

Dance may seem an unlikely option for addressing a progressive neurological condition, but it is proving to be beneficial for people with Parkinson's disease. IHBI researchers are seeing participants with improved balance, mobility, confidence and wellbeing.

IHBI Professor Graham Kerr is collaborating with Queensland Ballet, Associate Professor Gene Moyle and Erica Rose Jeffrey at QUT's Creative Industries and Professor Sandy Brauer at the University of Queensland on a program called Dance for Parkinson's.

The program involves people diagnosed with Parkinson's disease taking part in weekly 75-minute dance classes at Queensland Ballet studios, with a pianist and trained instructors. Research participants are measured for balance and gait; and interviewed at length about changes they have noticed and effects on their wellbeing.

Professor Kerr says dance addresses symptoms such as problems with gait, coordination, movement initiation and a decline in cognitive function.

'It has been demonstrated that dance may facilitate activation of areas of the brain that normally show less activation in Parkinson's disease,' he says. 'For example, dancing to a metered and predicted beat is capable of increasing activation of the putamen, a part of the brain that aids limb movement.'

Specific movement patterns are incorporated in dance, including those that people with Parkinson's disease may find difficult. Among them are walking backwards and turning.

Professor Kerr says sights, sounds and physical sensations such as pressure provide cues to people while they are dancing that are believed to bypass parts of the brain diseased in Parkinson's disease. 'Music may serve as an auditory cue to assist movement.'

Evidence exists that dance has a demonstrated effect on improving motor and cognitive skills in neurological disorders such as traumatic brain injury, spinal cord injury, stroke, autism and sensory loss. It also extends to older people and those with Alzheimer's and dementia.

Results have shown that Dance for Parkinson's is contributing to the physical, emotional and cognitive health of the participants, Professor Kerr says. 'It is helping daily mobility; providing social engagement and an outlet for creative expression; improving confidence; and contributing to a sense of empowerment.'

Enjoyment is the key to promoting long-term participation and adherence. 'Traditional physical therapies such as exercises may assist and benefit people with Parkinson's disease, but long-term adherence to exercise programs has proven to be challenging.'

Physiotherapist Nadeesha Kalyani is conducting a PhD study under Professor Kerr's guidance to determine the program's efficacy on cognition, balance and gait. Further research is being planned into the benefits of music and rhythmic movement, involving neuroimaging.

Professor Kerr says postural instability and gait disability leading to falls are hallmarks of Parkinson's disease, reducing confidence of movement, increasing fear of falling and consequently resulting in reduced activity. 'It is part of the downward spiral resulting in a host of health related problems.'

World Health Organisation data shows falls are the leading cause of injury deaths and disabilities among people aged 65 years and older, with 95 per cent of hip fractures resulting from falls.

At least one in three adults aged 65 and older will fall one or more times each year. Between 20–30 per cent will sustain moderate to severe injuries that reduce mobility and independence and increase the risk for premature death.

PARKINSON'S DISEASE

About 80 000 Australians, including more than 17 000 Queenslanders, are living with Parkinson's disease.

On average, 32 people are diagnosed every day, with 18 per cent of working age.

It is the second most prevalent neurological condition, behind dementia.

Symptoms include:

- tremour, particularly in the hands and limbs
- stiff muscles, difficulty standing and difficulty with bodily movements
- involuntary movements; slow shuffling gait
- sleep disturbances
- fatigue, dizziness, poor balance or restlessness
- amnesia, confusion in the evening hours, dementia, or difficulty thinking and understanding
- impaired voice, soft speech or voice box spasms
- anxiety or apathy

Symptoms are caused by a decline in the production of a brain chemical called dopamine.

Linking with healthcare specialists in a bid to improve end of life care

Palliative care is a specialised field, but many of the carers who look after older people around Australia have little of the knowledge and few of the skills needed for a person's end of life. IHBI researchers are building capacity and developing links with healthcare professionals to overcome the gaps.



Professor Patsy Yates

Professor Patsy Yates is leading IHBI palliative care research, with work that aims to improve care for older people and reduces the number of unnecessary hospital transfers. Among the research projects Professor Yates leads is Decision Assist Linkages, using Federal Government funding to strengthen partnerships between health and aged care services and achieve better end-of-life care.

Decision Assist Linkages involves aged care facilities in six states introducing linkage strategies that take into account the needs of older people, their families, carers and healthcare professionals.

'The project is based on the premise that effective, mutually beneficial linkages between a number of agencies have a positive impact on clinical outcomes,' Professor Yates says.

The linkage strategies include building multidisciplinary teams; standardising communication pathways, agreements and plans; appointing designated care coordinators; clarifying people's roles; enhancing knowledge and skills; and seeking continuous improvement.

Professor Yates says the goal is to ensure that older people have choices regarding end-of-life care, receive support to stay

in their home or residential aged care facility surrounded by familiar staff and avoid unnecessary transfers to hospital.

Actions at one facility included appointing a comfort care coordinator, who provided staff with a lanyard badge as a prompt to check an older person's hydration, warmth, comfort, pain and psychological state.

A mentorship arrangement was established at another facility to help community nursing staff build their knowledge and confidence, including attendance at palliative care conferences and receiving one-on-one training and telephone advice.

One South Australian facility established two palliative care rooms. Others formed steering committees; provided staff with training; and produced information packs.

Beyond establishing a staff support network and ensure suitable facilities, decision-makers acknowledged that site-specific measures needed to be taken to account for the cultural aspects of residents' lives. Culturally and linguistically diverse clients were found to have wishes based on their religion, cultural customs and practices that were important at end of life.

Staff at some facilities were provided cultural sensitivity training. A cultural profile tool was developed in Logan for staff to interact with elderly people and document care plans.

A facility in Western Sydney recognised that lesbian, gay, bisexual, transgender or intersex people had specific needs for end-of-life care and advance care planning.

In Brisbane, a partnership with community organisation Footprints enabled consideration to be given to older people with disabilities, mental illness, financial disadvantage or at

risk of becoming homeless. Many of the older people lacked conventional networks such as families, friends and reliable social supports to help them navigate the healthcare system, care for them or help them to put their affairs in order at the end of their life. Footprints provided social support, assistance with personal care, meal preparation and attendance at medical appointments.

Actions at many of the facilities addressed the high rates of transfers to hospitals. High rates resulted from staff having limited knowledge of palliative care; poor identification of people in a deteriorating or terminal palliative care phase; lack of advance care planning; and a lack of family education.

At one South Australian care facility, a hospital avoidance program was introduced, with ambulance officers providing treatment on the spot rather than transporting people to hospital in the first instance.

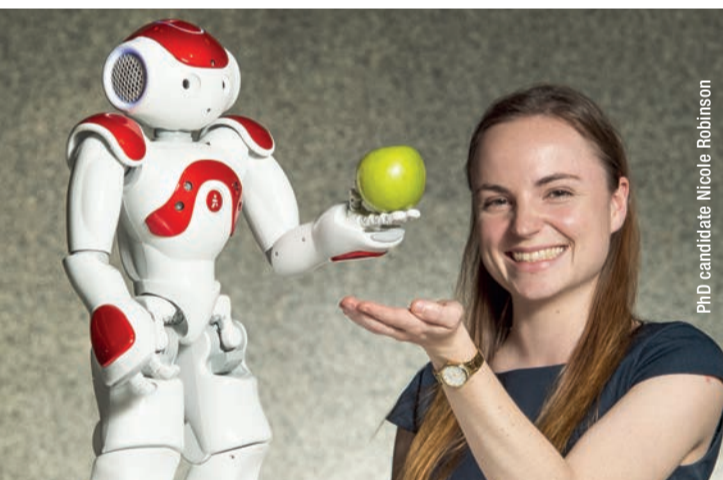
A similar program at a Broken Hill facility recorded an almost 50 per cent drop in the number of people dying in hospital from 2013 to 2015.

Professor Yates says linking aged care and palliative care providers enables workers at facilities to deliver quality end-of-life care. 'We know that supporting people at the frontline is critical to build capacity, but we also need systems and environments that enable the people at the frontline to deliver on their capabilities.'

Decision Assist Linkages is part of a larger Decision Assist Project led by Austin Health and funded by the Federal Government.

THE EXPERIENCE AT ECHUCA REGIONAL HEALTH, VICTORIA

Cultural respect and recognition were highlighted as the foundation, with respect for Aboriginal and Torres Strait Islander perspectives of death and dying and understanding that the perspectives may differ to conventional western beliefs. Yarning was used in place of formal meetings and questionnaires. Informal conversations were culturally friendly and recognised among Aboriginal people as a meaningful way to talk about something, someone or provide and receive information.



PhD candidate Nicole Robinson

Social robots join the front line to target rising obesity rates

Close to two-thirds of Australians aged over 18 are overweight or obese, with more than a quarter of adults considered obese. Tapping into a person's desire is a key to motivating them to improve their lifestyles and ultimately their health. IHBI is using robots to build desire.

PhD candidate Nicole Robinson is part of an Australian-first study that aims to determine if social robots can encourage healthy eating habits. Under the guidance of IHBI Professor David Kavanagh, she is recruiting volunteers keen to cut down their snacking and consumption of drinks high in sugar and fat.

Ms Robinson is using social robots she has named Andy and Rob in three trials, with one focusing on obesity; one looking at teenagers with type 1 diabetes; and another determining the acceptability and likability of social robotics as a tool for improving healthcare.

'Talking to another person face to face about your diet can be a little intimidating for some people,' Ms Robinson says. 'Robots are non-judgmental and we want to see if people feel like they can talk more freely without fear of judgement.'

'The robots are not designed to take the place of healthcare professionals. Their role is to be an extra health tool that can provide routine, low-cost and consistent treatment for healthcare professionals, so healthcare professionals can focus on more intensive aspects of their work.'

Robots combine speech, movement and social capabilities, enabling demonstrations of physical actions; or referencing of body parts, medical actions or treatments. It also opens pathways for discussing goals, progress and a person's behaviour change in a sensitive and collaborative manner.

'The robots are not designed to make people feel bad about their snack food choices. Instead, they ask questions about how their health would improve, what they would like to do, the goal that may work best for them, and ways to achieve them.'

Interaction with the robots aims to tap into a person's desire, affecting their motivational drive to be healthy and building the basis for routine lifestyle behaviour patterns. Desire consistently impacts daily actions. In the process, it can either create healthy choices or interrupt healthy lifestyle patterns with actions that inhibit progress towards a healthy lifestyle. A long-term routine that steers desire regulation towards healthy actions and

control of unhealthy targets is vital for achieving the best lifestyle outcome.

Mental imagery forms an important part of breaking habits such as excessive food intake with low nutritious value. It involves re-imagining external stimulus or imagining a new experience using the mind's ability to create and experience sensory attributes.

'Mental imagery has shown to play a causal role in a person's motivational drive,' Ms Robinson says. 'Imagery directs a person's attention towards pursuing a goal linked to a pleasurable outcome.'

Ms Robinson travelled to England last year to visit a research team at Plymouth University to learn more about their world-leading project using social robots to encourage people to be more active. She learned about robot programming and is using the skills to introduce a similar program in Australia, with a focus on eating rather than exercising.

The ultimate aim of the program is to reduce the high levels of obesity and improve people's blood glucose levels and cardiac health. Obesity is linked to heart disease, hypertension, cancer, stroke and diabetes.

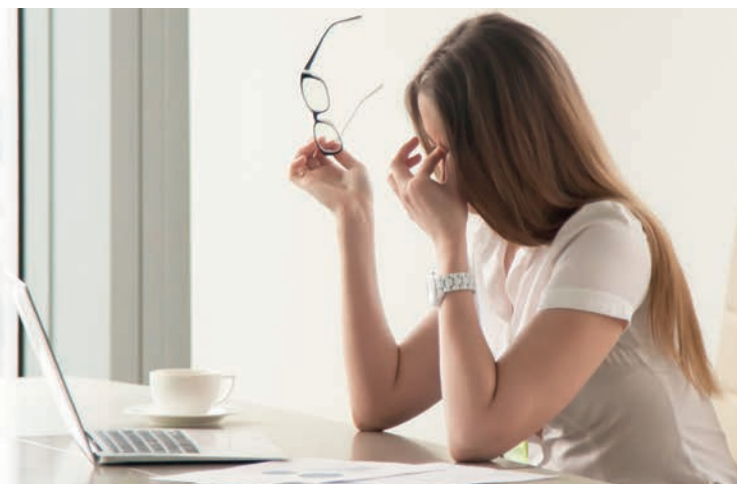
'We have alarmingly high obesity rates. Being overweight can lead to a host of related health problems so any methods we can adopt to have a positive impact on weight should be considered,' Ms Robinson says.

JOINING THE TRIAL

Nicole Robinson is seeking people who are 18 years of age and older who snack on food and drinks high in fat and sugar most days, and who want to reduce their snack intake. It is important that they have not been diagnosed with an eating disorder.

MAKE CONTACT

Phone Ms Robinson on 07 3069 7533 or email robofit@qut.edu.au



Understanding genetics a key to diagnosing migraine subtype

Migraine is a complex disease with diverse characteristics and traits, making diagnosis difficult. IHBI researchers are leading a collaboration that aims to understand the genetics of a severe form of migraine and develop a cost-effective diagnostic test.

Familial Hemiplegic Migraine (FHM) is a migraine subtype causing severe migraine, weakness, hemiparesis and, in some cases, extended coma. Hemiparesis—a weakness of one side of the body that can, in severe cases, cause paralysis—is similar to stroke symptoms, making it difficult to distinguish between the two neurological disorders.

IHBI Executive Director and molecular geneticist Professor Lyn Griffiths is leading research through the Genomics Research Centre (GRC) to identify novel genetic mutations that cause FHM. Findings from the research will then be used to design and further develop diagnostic tests for this and related disorders.

'It is important for clinicians to be able to differentiate FHM and related conditions such as ataxias and stroke to ensure appropriate clinical responses for patients,' Professor Griffiths says.

Molecular genetic testing is seen as the best avenue for aiding in the diagnosis of FHM. Several genes have already been

identified in large family studies as causing FHM. The GRC conducts diagnostic testing for the known mutated genes that cause FHM.

However, fewer than 25 per cent of the FHM patients undergoing diagnostic testing are positive for the known genes, meaning additional genes are responsible for the migraine subtype.

Researchers also plan to use stem cells called induced pluripotent stem cells (iPSCs) in the laboratory to test for pathogenicity of detected novel genetic mutations. Pathogenicity refers to the ability of an organism to cause disease.

The cells are obtained from FHM patients and modified, or reprogrammed, through a process called dedifferentiation, with researchers changing their genes to steer them to develop the required mutated cell type for testing. This enables researchers to determine the effect of the mutations on cell function and, in turn, how this relates to disease.

Professor Griffiths says the work has the potential to enable data generation on many rare disease-causing mutations.

'The research will enable more accurate diagnosis and treatment of FHM, but will also provide a model for developing better diagnostic tests of related conditions,' she says. 'The approach and technologies are applicable to many genetic disorders. Hence the project has significant diagnostic, clinical and translational relevance.'

A multidisciplinary approach is being used for the research, with collaborators from IHBI, other areas of QUT, the University of Oxford and the University of Wollongong contributing expertise

in molecular genetics, genetic epidemiology, molecular biology, functional cell analysis, stem cells, clinical neurology and biostatistics.

They will use facilities at the GRC, tapping into the diagnostic laboratory's membership of Therapeutic Innovation Australia. The laboratory has also been conducting a pharmacogenetics trial testing a preventative treatment as a potential therapy for people with migraine with aura.

Professor Griffiths says a multidisciplinary approach is needed, given the complexity of migraine, its prevalence and the impact on people's lives.

Migraine is a debilitating neurovascular disease affecting about 12 per cent of the population, with a tendency to run in families suggesting a strong genetic influence. Characteristic features of migraine include throbbing head pain, nausea, vomiting, discomfort or pain to the eyes due to light exposure, hypersensitivity to sounds and often severe, neurological disturbances.

In addition to people's symptoms, migraine has severe social and economic impacts. Data from a 2013 study ranks migraine as the most burdensome neurological disorder and the sixth highest cause of disability worldwide.

There are more than three million people with migraine in Australia, meaning that more people suffer from migraine in Australia than diabetes, asthma or coronary heart disease.

REAL HEALTH PUBLIC SEMINAR

Join migraine researchers, geneticists and neurologists who understand genetics, biology, medicine and – importantly – working with patients.

Date: Saturday 15 July

Time: 10.30–1130am, followed by refreshments

Place: QUT Kindler Theatre, Room P421, P Block, Gardens Point Campus, 2 George Street, Brisbane City

Cost: Free

Website: www.qut.edu.au/ihbi/migraine-seminar

Technology put to the test in bid to prevent skin cancer

Technology is increasingly playing a role in prevention of sunburn and skin cancer, with personal UV detectors, sunscreen indicator patches and software apps encouraging people to take responsibility for monitoring their health. IHBI researchers are putting the technology to the test.



Dr Elke Hacker

Dr Elke Hacker is conducting research at IHBI focused on understanding the interacting roles of sunlight, genetic susceptibility and mutation in melanoma development.

The research aims to develop preventative strategies to reduce skin cancer, the most prevalent cancer in Queensland with a melanoma incidence rate of 71 cases per 100 000 people. The incidence vastly exceeds rates in all other jurisdictions nationally and internationally. Australia-wide, the incidence is 50 cases per 100 000 people.

SKIN CANCER: SIGNS TO LOOK OUT FOR

Normal, healthy freckles and moles usually have a smooth edge or an even colour. Skin cancers do not all look the same, but there are some signs to look out for including:

- A spot that is different from other spots on the skin
- A spot, mole or freckle that has changed in size, shape or colour
- A sore that does not heal
- A spot that bleeds

Visit a general practitioner for initial tests.

Dr Hacker says ultraviolet radiation (UVR) exposure from sunlight is the main risk factor for skin cancer, with sunburn indicating a damaging dose. Despite community awareness campaigns, many Queenslanders are still regularly becoming sunburnt.

'It is pleasing that new technology is encouraging increasing numbers of people to take responsibility for their actions in avoiding over-exposure to UVR,' Dr Hacker says.

'But how are these new devices or health apps regulated or tested? We want to test the effect of the devices on improving sun protection habits, sun exposure behaviours and reducing sunburn in Queensland.'

In contrast to parts of the world such as the UK, Canada and Europe, Queensland has ideal conditions for conducting such studies, with substantially longer sunny periods enabling trials to run all year.

Among Dr Hacker's research projects is one that involves UV SPOTS and personalised wearable weather stations. She is working with people aged 18 to 30 who record their sun exposure using a smart phone app for seven days, test the new technology and take part in focus groups.

Dr Hacker is part of a new centre that will test technology, in partnership with specialist early phase clinical trial company Q-Pharm, with the aim of delivering scientific services grounded in academic rigor and expert advice to emerging industries.

She is also working with the start-up company Suncayr at the Johnson & Johnson Innovation Partnering Office at QUT to test new sun stickers, which warn people when the effect of sunscreen has worn off and sunscreen needs to be reapplied.

It is important for the research to be conducted, Dr Hacker says, to ensure claims made about devices and health apps can be substantiated and they meet safety and regulatory standards. 'As the tested products become evidence-base and enter the market, they will assist the Queensland community to improve health outcomes,' she says.

'Testing products and encouraging use of new technologies that can stand up to the harsh Queensland environment is important so we can deliver cost-effective prevention programs to the community.'

The centre will work with patient advocacy group Melanoma Patients Australia and Queensland Health's Preventative Health Branch to ensure the findings and results are translated into products and services for use in the community.



Dr Tony Parker

Researchers set sights on cell behaviour in burn wounds

Wound healing is a major issue for children with burns because of the potential impacts into adulthood. Scars do not grow as the child does, causing abnormal contraction of joints and functional disability.



IHBI's Dr Tony Parker is part of a collaboration that involves researchers and clinicians working to better understand cell behaviour in burn wounds and limit scar formation. Dr Parker's team has found structures called exosomes, which are released from cells, are abundant in paediatric burn blister fluid and may affect wound healing.

The collaboration involves IHBI's Dr Leila Cuttle, a National Health and Medical Research Council Career Development Fellow working on paediatric burns at the Centre for Children's Health Research. It also includes Professor Roy Kimble, a burns surgeon at the Lady Cilento Children's Hospital; and Dr Carlos Salomon, an expert in exosomes from the University of Queensland's Centre for Clinical Research.

They have completed the first phase of a study to describe exosomes in burn blister fluid and will now expand their

research to determine the role they play. 'Exosomes are known to be involved in cell-to-cell communication,' Dr Parker says. 'They can elicit profound effects in the behaviour and function of cells. What we don't yet know is if the exosomes in blister fluid positively or negatively affect wound healing.'

Present treatment approaches include removal of the blister roof and blister fluid to enable examination of the wound bed to determine depth and extent of injury. However, it is unclear whether the approach enhances the speed and quality of wound healing.

There is a limited understanding of the relationship between the molecular make-up of the burn wound environment and risk factors associated with scar formation or poor healing. Factors include the depth of an injury, the time it takes to heal and the surface area of the body that is affected.

'There is a need to better understand the biological effect of burn blister fluid on burn wound healing outcomes in order to make recommendations regarding the initial treatment of burn injuries,' Dr Parker says.

It is important to understand the role of exosomes because they could prove to be a negative influence in burns, promoting inflammation; or could provide a positive role in healing and regrowth of damaged tissue.

Research so far has included the measurement of more than 800 proteins in burns of various depths, revealing the presence of exosomes; and the production of a comprehensive

protein catalogue. Follow-up research will focus on further characterisation of the exosomes so their role is understood and decisions can be made about hospital treatments.

'The research is significant because it will help determine if better healing of burns in children can be achieved by removing blisters or leaving them intact following a burn injury,' Dr Parker says. 'The outcomes of the research will yield new knowledge that will have direct clinical impact.'

The researchers have used funding from the Wound Management innovation Cooperative Research Centre and public donations; and collected blister fluid from patients at the Lady Cilento.

'Burns injuries place a devastating physical and emotional burden on children and their families. For children with deep burn injuries, the ongoing surgeries, skin grafts and rehabilitation are like having a chronic disease because treatment is often required well into adulthood.'

THE STUDY

Zang T, Broszczak DA, Cuttle L, Broadbent JA, Tanzer C, Parker TJ. (2016) The blister fluid proteome of paediatric burns. *Journal of Proteomics* 146: 122-132.

<https://eprints.qut.edu.au/107666/>



EXECUTIVE DIRECTOR'S REPORT

Sometimes, research can make it easier for people to have difficult conversations, whether it be about unhealthy eating, poor sun protection, ageing or even dying.

This edition of *IHBI Advances* details research that puts the spotlight on issues affecting important life stages: burns in children and the impact into adulthood; type 1 diabetes and how teenagers monitor the disease for lifelong health; and young adult behaviour in preventing skin cancer.

At the other end of life, IHBI research aims to improve the balance, coordination and confidence of people diagnosed with Parkinson's disease; and the quality of life of older people and their end-of-life care.

Most of us appreciate that Australia has an ageing population, bringing with it requirements for higher levels of care, additional resources and funding, training for healthcare workers and a need to confront ethical considerations. It makes the work of Professor Patsy Yates very topical, as she leads IHBI's palliative care research to improve care and reduce unnecessary hospital transfers. The work is based on real world experiences and involves aged care facilities in six states.

Similarly, collaboration is a hallmark of Professor Graham Kerr's research into Parkinson's disease, involving Queensland Ballet, QUT's Creative Industries and physiotherapists at the University of Queensland. Early results are promising, with improvements in mobility, cognitive skills and confidence.

Technology is important in Nicole Robinson's research, with social robots used to address another important Australian health challenge: obesity. With close to two-thirds of Australians aged over 18 classified as overweight or obese, the robots are being used to encourage healthy eating habits. They are also looking at teenagers with type 1 diabetes to determine robotic efficacy in controlling blood sugar levels.

Behaviour and technology are also key to Dr Elke Hacker's research. She aims to encourage people to take responsibility for monitoring their health and prevent sunburn and skin cancer, while using personal UV detectors, sunscreen indicator patches and software apps.

Dr Tony Parker is leading research that has identified structures within cells present in children's burn wounds, enabling experts

in burns, wound healing, biology and surgery to determine how they may impact on healing and scar formation. Ultimately, the team aims to limit scar formation, given the contraction of joints and functional disability caused as a child grows.

Finally, I would like to invite you to our second Real Health public seminar, with a focus on migraine. It is a research area that I have been interested in for years, with recent developments advancing our understanding of the genetics and biology of the disease; and providing a platform to develop diagnostic tools and more personalised clinical treatments. I look forward to seeing you on Saturday, July 15.

Professor Lyn Griffiths
Executive Director, IHBI

FIND OUT MORE: support IHBI



Yes, I would like to support IHBI's health research

If you would like to help us make the possibility of better health a reality, please fill out the form and send it with your donation to:

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Contact Senior Development Officer
Email giving@qut.edu.au
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