QUT ihbi
Institute of Health and Biomedical Innovation

# BETTER HEALTH IN OUR LIFETIME

IHBI ANNUAL REPORT 2018

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# Contents

# A message from the Executive Director

## A successful year of research, collaboration and engagement

Collaboration is key to advancing IHBI research and ensuring it has impact and relevance, regardless of whether the outcome relates to disease and injury prevention, treatment, patient quality of life or the development of therapeutics and medical devices.

IHBI researchers have collaborated widely in 2018, working with the best minds from around the world, gaining an understanding of industry requirements and working with clinicians to produce benefits for patients.

Cancer researchers at IHBI are using their collaborative networks to make significant strides. Professors Derek Richard and Ken O'Byrne will advance their work to develop improved therapeutics for the treatment of diseases associated with ageing, with the signing of a key industry agreement. They aim to establish a clinical trial and recruit a cohort of patients.

Similarly, Professor Colleen Nelson will work with patients to better understand what causes prostate cancer, how to stop or slow its progression and how to provide the best care to enable men to have quality of life.

She will lead research at IHBI's Australian Prostate Cancer Research Centre – Queensland as part of an international registry of 5000 men with advanced prostate cancer, collecting clinical, biological and quality of life information. It cements the centre as a global partner collaborating with patients, their families, doctors and researchers to improve prostate cancer outcomes.

Support from competitive funding is driving Associate Professor Andrew J Zele collaborative research, studying the effects of light on human behaviour and vision. The research has a potential role in early detection of a range of eye diseases, mental health issues and neurodegenerative disorders.

New competitive funding is also providing support for important research in areas such as child bronchiectasis, developing therapeutics, burn wound care, child maltreatment and improving medical outcomes for vulnerable people.

Investing in cutting-edge equipment and conducting research at strategically important locations enables synergies that result in advances across the IHBI research programs. Among the beneficiaries is Associate Professor Makrina Totsika, who is using excellent IHBI facilities at QIMR Berghofer and collaborating widely as she translates understanding of bacterial adherence into overcoming antibiotic resistance among common bacterial infections.

Successes are not limited to IHBI's research leaders, with PhD candidates and early career researchers leveraging opportunities, gaining skills and building their own collaborative networks.

PhD candidate Naomi Paxton had a particularly successful 2018, winning a major award, securing a competitive national travel grant and promoting research and careers in science. She advanced her skills in a multidisciplinary area of research: using medical 3D printers to create patient-specific implants to treat bone trauma or congenital defects.

IHBI researchers have achieved in many fields of endeavour in 2018, securing competitive funding, working collaboratively and gaining new insights in important areas of disease and injury. The achievements put IHBI researchers in good stead to ultimately deliver better health in our lifetime.

**Professor Lyn Griffiths**

IHBI Executive Director
April 2019

# IHBI 2018

## 2018 overview

Researchers secured funding and cemented collaborations with industry, clinicians and leading research institutes around the world, enabling advances in key research areas and providing IHBI with major successes in 2018.

IHBI continued to advance activities that aligned with its focus on research excellence, relevance and impact and with disease areas identified nationally and globally as strategically important. Major successes in 2018 enable IHBI researchers to:

- Work with patients, their carers and doctors in health care settings and as part of clinical trials
- Access state-of-the-art facilities and expertise to advance their research
- Continue to grow collaborative networks
- Build a transdisciplinary culture to aid the understanding of complexity of disease and injury
- Train the next generation of scientists and innovators
- Develop an advanced manufacturing industry, with global perspective and impact.

## IHBI achieves growth across key performance indicators

IHBI's key performance indicators (KPIs) are defined by the IHBI Executive, QUT. The key KPI of increasing research income has been achieved in 2018 and student numbers continue to be substantial.

IHBI's KPIs are also strongly aligned with the requirements of the Queensland Government. The KPIs address employment, collaboration, technology transfer and commercialisation.

| KPI | 2006 | 2016 | 2017 | 2018* |
|---|---|---|---|---|
| **External Income** | $20 133 104 | $45 817 098 | $47 360 575 | $48 106 366 |
| **Academic impact: Publications** | 380 | 1386 | 1276 | 844 |
| **HDR students: domestic** | 204 | 451 | 436 | 407 |
| **HDR students: international** | 52 | 216 | 226 | 228 |

**Table 1:** IHBI maintained sound achievement for its KPIs
*provisional data based on 31 December 2018 figures

# Impact

IHBI research is having an impact in advancing knowledge in various fields, with wide collaboration, a focus on translation and support from competitive funded grants. Researchers focus on improving healthcare through a variety of channels, including digital disruption, improved diagnostic tools and combining health and law.

**Image:** Associate Professor Andrew J Zele

IHBI Associate Professor Andrew J Zele is part of a collaborative research team studying the effects of light on human behaviour and vision. He is using an Australian Research Council (ARC) Future Fellowship to focus on melanopsin ganglion cells and their potential role in vision and the early detection of a range of eye diseases, mental health issues and neurodegenerative disorders.

The collaboration includes visual neuroscientists, ophthalmologists, chronobiologists, electrical engineers, psychologists, microbiologists, industry partners and professional bodies such as the Lighting Council Australia.

His collaborative research has already resulted in world first clinical research of melanopsin dysfunction in humans. Melanopsin is a type of photopigment belonging to a larger family of light-sensitive retinal proteins found in intrinsically photosensitive retinal ganglion cells (ipRGCs).

'We are providing new understanding of how melanopsin interacts with the other photosensitive elements in the eye, rods and cones, to give rise to vision and non-vision functions and reveal how that balance is important for normal, healthy eyesight.' Associate Professor Zele said.

'The effects of light on human health and well-being are as important as diet and exercise.'

Associate Professor Zele leads IHBI's Visual Science Laboratory and collaborates closely with Medical Retina Laboratory head Associate Professor Beatrix Feigl. They lead research at IHBI into ipRGCs, which are found in the inner retinal layers and distribute light information across more than a dozen parts of the brain.

Their functions extend beyond image formation to setting the body clock, maintaining circadian rhythm and affecting the brain's mood centre.

The ipRGCs can be studied by measuring the pupil light reflex, using a customized pupillometer Associate Professor Zele's team developed at IHBI specifically for the purpose.

The equipment enables the cells to be measured and changes detected, pointing to the presence of retinal dysfunction in some ophthalmic and neurological disorders, at an earlier stage than standard ophthalmic tests.

The research that associate professors Zele and Feigl conducted on melanopsin input to the non-image forming control of the human pupil light response contributed to an international pupillography standard for measuring human melanopsin function, released in early 2019.

'Retinal changes have been detected in patients with diabetes, age-related macular degeneration, glaucoma, depression and Parkinson's disease,' Associate Professor Zele said. `Emerging evidence points to a retinal contribution in sleep and circadian dysfunction experienced by many patients with the conditions.'

Associate Professor Zele said the research provided direction for how artificial lighting, including the careful control of exposure to blue light such as that emitted by computer devices, could be designed to limit the effects of circadian dysfunction and influence a person's alertness, cognitive function and mood.

The research builds on the work of Associate Professor Zele's team in providing the initial evidence that melanopsin photoreception, independent of the traditional rod and cone pathways, can give rise to the conscious, image-forming visual perception and that its interactions with the canonical cone pathways provide the neural code for a person to be able to ascertain the brightness of a light.

He said the knowledge redefined textbook understanding of how the retinal output was used for visual perception.

Collaborators involved in the ongoing research are based at QUT, including former PhD student Dr Prakash Adhikari, and the Queensland Eye Institute, as well as internationally in the US, Europe and the UK.

'An exciting new technique developed by our group in partnership with researchers from five international sites is a method to record the electrical response of the eye, like an electrocardiogram of the heart, for isolating signals from the melanopsin pathways in the eye,' Associate Professor Zele said.

International connections extend beyond the two IHBI research teams to include Professor Dingcai Cao's team at the University of Illinois in Chicago in the US, Professor Jan Kremers at Friedrich Alexander University of Erlangen-Nuremberg in Germany and clinicians at the Queensland Eye Institute.

'The effects of light on human health and well-being are as important as diet and exercise.'

The collaborations aim to provide a two-fold benefit to people's health, with the aim of using IHBI's Medical Retina and Visual Science laboratories to understand disease patho-mechanisms for developing early detection and prevention strategies; and provide insights that inform clinical practice for effective treatment. Among the potential treatments is light therapy.

- **Associate Professor Andrew J Zele** was awarded an Australian Research Council (ARC) Future Fellowship, with $988 541 for a project entitled *Vision and lighting in the age of melanopsin*.
- IHBI secured three ARC Discovery Project grants. **Professor Lyn Griffiths** led a successful bid, with $590 000 for a project entitled *Characterising inheritance patterns of whole genome DNA methylation*. **Professor David Atchison** led a successful bid, with $425 000 for *Relationship of retinal directionality to human retinal anatomy variations*. **Professor Joanne Wood** led a successful bid, with $399 458 for *Using visual science to reduce the dangers of night driving*.
- Researchers from IHBI and QUT's Australian Centre for Health Law Research jointly secured a National Health and Medical Research Council (NHMRC) Partnership Project grant, with $504 188 for a project entitled *Reducing Non-Beneficial Treatment at the End-of-Life*.
- **Adjunct Associate Professor Rosana Pacella** led a successful bid for a NHMRC Project grant, with $2 311 217 for a project entitled *The first national study of child maltreatment in Australia: prevalence, health outcomes, and burden of disease*.
- **Associate Professor Leila Cuttle** led a successful bid for a NHMRC Project grant, with $1 224 150 for a project entitled *The use of biomarkers in children to predict healing potential and optimise burn wound care*.
- **Professor Stewart Trost** led a successful bid for a NHMRC Project grant, with $1 169 557 for a project entitled *Short and long-term effects of therapeutic exercise in children with bronchiectasis: a multi-centre randomised controlled trial*.
- **Associate Professor Tony Kenna** led a successful bid for a NHMRC Project grant, with $576 807 for a project entitled *Evaluation of a new therapeutic strategy for treatment of systemic sclerosis and systemic lupus erythematosus*.
- **Associate Professor Steven McPhail** was the recipient of a Medical Research Future Fund (MRFF) Next Generation Clinical Researchers Program – Career Development Fellowship, securing $483 404 for a project entitled *Embracing digital disruption in hospitals to improve outcomes among vulnerable people*.
- **Dr Yi-Chin Toh** was the recipient of an ARC Future Fellowship, with $723 125 for a project entitled *Modular microfluidic platform for mimicking multi-organ system interactions*. Dr Toh will join QUT and IHBI from the National University of Singapore.

# Outstanding researcher achievements

Research excellence is at the core of IHBI activities, enabling translation into better healthcare and improved patient outcomes. Peers, peak bodies and government agencies recognise the excellence through high-profile awards, honorary memberships and fellowships.

**Image:** Associate Professor Jyotsna Batra

Associate Professor Jyotsna Batra is taking major strides in discovering genetic variations that predispose men to prostate cancer risk, working as part of an international research consortium and using actual patient samples.

The research resulted in Associate Professor Batra being named Cure Cancer Australia's Researcher of the Year 2018.

The majority of prostate cancer tumours are not life-threatening, but present diagnostic processes are unable to accurately predict which men require treatment.

Associate Professor Batra is interested in using genetics to identify cancer early and to distinguish between slow growing prostate cancer and aggressive forms of the disease. She aims to identify tiny changes in DNA, called Single Nucleotide Polymorphisms (SNPs), and establish their link to the cause, development and progression of prostate cancer.

The research has the potential to detect cancer early and discriminate between forms of the disease at an early stage, so oncologists can determine the best treatment options.

Not all cancer medicines benefit all cancers – or patients. Insights into the form and severity of a specific patient's cancer could eventually save them from receiving a cocktail of ineffective medicines.

Associate Professor Batra is part of the international prostate cancer consortium PRACTICAL. From 3 billion base pairs of DNA modules, the consortium has been able to drill down and focus on about 150 genetic variations of interest.

`By analysing the DNA of about 100 000 people, half of which belongs to prostate cancer patients, we've identified more than 150 genetic variations associated with prostate cancer risk,' she said. 'They can collectively explain about 30 per cent of the inherited component of the disease.'

Collaborating with other IHBI colleagues at the Australian Prostate Cancer Research Centre – Queensland and the Australian Prostate Cancer Bioresource, based at the Translational Research Institute, Associate Professor Batra is also studying the effects of SNPs on proteins encoded by a person's DNA.

DNA is the molecule found in every cell, containing a person's genetic code and instructing cells what proteins to make.

Proteins form enzymes, responsible for much of the work in cells, and are also an important building block in tissues. They are made in the main body of the cell.

But DNA is only in the nucleus of the cell. A copy of the DNA is made, called a messenger RNA (mRNA), capable of moving through pores in the membrane to the main body of the cell. When DNA is copied, mistakes are sometimes made, called mutations.

Associate Professor Batra is also studying the SNPs in the KLK3 protein, commonly called prostate specific antigen (PSA). The protein is an important clinical biomarker, potentially pointing to the presence of disease in a patient.

Recent research shows that the SNPs can change the PSA levels in men and thus the interpretation of the PSA results can be influenced by the presence of the SNPs.

'I am conducting genetic analysis to identify genes that define disease risk. One gene discovered through genome-wide association studies involving my laboratory is already proposed as a clinical biomarker for prostate cancer diagnosis and prognosis.

'Present diagnosis is unable to predict the presence of high risk, aggressive disease so many men proceed to biopsy and treatment unnecessarily,' she said. 'Research indicates that large numbers of patients will undergo treatment that will not benefit them. It will only make them sick and adversely impact on their quality of life.

'I would like to avoid such scenarios and ensure that patients have the best quality of life.'

## OTHER IHBI ACHIEVEMENTS

- Clinical researcher in emergency pre-hospital care, **Professor Vivienne Tippett**, was acknowledged in the 2018 Queen's Birthday Honours List, awarded a Medal of the Order of Australia (OAM) for her outstanding service to medical education.
- **Distinguished Professor Patsy Yates** was the first researcher from outside of North America to receive the prestigious Distinguished Researcher award from the international Oncology Nursing Society, recognising research contributions that enhanced the science and practice of oncology nursing.
- **Professor Lidia Morawska** and her colleagues from the International Laboratory in Air Quality and Health received the Eureka Prize for Infectious Diseases Research for uncovering the process by which the deadly pathogens causing airway infections are transmitted between cystic fibrosis patients. The research led to reduced infection rates among cystic fibrosis patients.
- **Distinguished Professor Dietmar W Hutmacher** received the 2018 Ramaciotti Medal for Excellence, awarded to a researcher that has made an outstanding discovery in clinical or experimental biomedical research.
- The Australian Society for Microbiology has awarded **Associate Professor Makrina Totsika** the Frank Fenner Award, in recognition of her distinguished contributions to microbiology research in Australia.
- **Professor Mia Woodruff** was awarded the 2018 Women in Technology Life Sciences Research Leader Award, in recognition of a significant contribution to Queensland Life Sciences industries, research and development.
- **Professor Samantha Keogh** and **Associate Professor Andrew J Zele** were appointed to the 2018 Excellence in Research for Australia (ERA) Research Evaluation Committee for Medical and Health Sciences. ERA is a comprehensive evaluation that examines the entire output of Australian universities' research efforts.
- **Professor Adrian Barnett's** leadership in mathematical sciences was recognised with his appointment to the board of peak body Science and Technology Australia.

# International collaborations

IHBI researchers work with the best minds from around the world as part of collaborative partnerships that focus on developing solutions for pressing global medical issues. Funding from international organisations enables formation of transdisciplinary research teams, while travel for conferences and meetings provides avenues for knowledge sharing and advancing research in fields such as biomedical engineering, implant shape design and driver behaviour.

**Image:** Dr Beat Schmutz

## Patient-specific method for treating large bone defects

Dr Marie-Luise Wille is collaborating with German researchers and orthopaedic surgeons to develop a novel, advanced and complementary patient-specific method to treat large bone defects.

She secured an Australia-Germany Joint Research Co-operation Scheme grant from Universities Australia in 2018 to travel to the Technical University of Munich (TUM) and the University of Würzburg.

An aim of the collaboration is to merge the German experience in orthopaedic surgery with IHBI expertise in tissue engineering and 3D printing.

Dr Wille is part of the Australian Research Council Industrial Transformation Training Centre in Additive Biomanufacturing, based at IHBI, where transdisciplinary teams are developing a technology that enables a 3D printed scaffold to be customised to the patient, with a specifically designed internal architecture guiding the new bone formation and maturation. After the bone has been formed, the scaffold slowly degrades and only the patient's own bone remains.

Researchers at the centre led the design and prototype fabrication of the first 3D-printed biodegradable shin bone implant in 2017, replacing bone that a young Gold Coast man lost through infection. The team also led design of a 3D printed model of the bone defect for surgical planning.

Doctors have reported no infection since the operation. Its success led to approaches from German surgeons seeking to conduct similar operations. IHBI Adjunct Associate Professor Boris Holzapfel led three such operations at the University Hospital of Würzburg, while another operation was conducted in Munich in February 2018, involving another tumour patient.

Dr Holzapfel is part of Dr Wille's collaboration, bringing a wealth of knowledge in joint replacement and treatment of bone defects, such as those resulting from trauma, cancer and infection. TUM's Professor Martijn van Griensven and Associate Professor Elizabeth Rosado Balmayor are also part of the collaboration, with expertise in regenerative medicine in the area of experimental trauma surgery.

'The funding will enable IHBI researchers to work closely with German clinicians to experience the surgeon's needs in order to standardise the patient-specific bone scaffold requirements and to build streamlined processes,' Dr Wille said. `Exchange visits are necessary to truly understand each other's needs and limitations.

'The collaboration will lay the foundation for internationally competitive research and industry programs aiming to provide alternative methods to treat large bone defects with less complications and faster healing perspective.'

## Hip fracture implant shape design and optimisation

Dr Beat Schmutz is using his expertise in implant shape design and optimisation to ensure a close match with a patient's anatomy during hip and femur fracture treatments.

He has worked with product development groups from global orthopaedics company and industry partner DePuy Synthes (DPS), part of Johnson & Johnson, in the US and Switzerland on the design and validation of new implant shapes for the development of two nails. The first, the TFN-ADVANCED (TFNA) Proximal Femur Nailing System has been in use in surgery since 2015, while the Femoral Recon Nail (FRN) has been used since June 2018.

The work builds on a collaboration with DPS stretching back 10 years and involving IHBI input from Professor Michael Schuetz and members of the Trauma Research Group in the development of several implants for fracture treatment. Under the leadership of Dr Schmutz, the research associated with nail fit has attracted awards at four international conferences.

Factors that determine differences in bone properties such as shape and size include age, gender and ethnicity. Older people are likely to have weaker bones and signs of bowing, while women commonly have smaller bones. Ethnicity is linked to differences in bone curvature and length, in part based on a person's height.

Surgeons have several implant options, with each nail similar in shape but having varying lengths, diameters and different angles for hip screw fixation.

Traditionally, design validation of the nail shapes involves surgically implanting nails in the lab using anatomical specimens, and the fit being assessed using 2D x-ray images. However, the images generated contain distortion and do not necessarily indicate the true fit between the nail and the bone.

Dr Schmutz has overcome the limitations through use of a customised nail fit tool, using computer graphical 3D modelling, developed in collaboration with Professor Schuetz. The software that drives the nail fit tool was developed at IHBI as part of Jayani Amarathunga's PhD project, under the supervision of Dr Schmutz, Professor Schuetz and Professor Prasad Yarlagadda.

### OTHER IHBI INITIATIVES

- **Distinguished Professor Dietmar W Hutmacher** was awarded a 2018 Humboldt Research Award to collaborate with peers from the Max Planck Institute of Colloids and Interfaces in Potsdam, Germany, extending a study of bone structure and genetic and environmental influences.
- **Professor Jeremy Davey** was awarded a Fulbright Senior Scholarship, enabling travel to conduct collaborative research on drug-driving at Kansas State University in the US.
- **Professor Joanne Wood** presented a talk as part of the Distinguished Lecturer Seminar Series at the Schepens Eye Research Institute, Massachusetts Eye and Ear, Boston in recognition of her unique expertise and outstanding accomplishments in the field of driving research.

# Industry involvement

IHBI researchers collaborate with industry partners, undertake research and development contract work and establish start-up companies as part of the translational focus of their work. The goal is the development of new and improved therapeutics, diagnostic tests, medical devices, vision correction and preventative treatments.

**Image:** Professors Ken O'Byrne and Derek Richard

The translational cancer research of professors Derek Richard and Ken O'Byrne was globally recognised, with the signing of a key industry agreement at the 2018 BIO International Convention in Boston in the US.

QUT signed three industry agreements at BIO, including a major announcement for a promising pre-clinical anti-cancer therapeutic candidate that IHBI's Cancer and Ageing Research Program (CARP) invented. QUT's innovation, venture and investment company, QUT bluebox, signed an exclusive deal to licence the development of the candidate DKLS02 to CARP Pharmaceuticals Pty Ltd.

CARP Pharmaceuticals secured $4.3 million in funding for the continued development of DKLS02 with the aim of establishing a clinical trial and recruiting a cohort of patients.

Professor Richard is Scientific Director and Professor O'Byrne is Clinical Director of CARP, and both are co-inventors of DKLS02, along with CARP researchers Dr Laura Croft and Sam Beard.

CARP consists of a multidisciplinary team of scientists and clinicians working to develop improved drugs for the treatment of diseases associated with ageing. The team has 34 scientists working in IHBI laboratories at the Translational Research Institute (TRI), alongside colleagues from the Australian Prostate Cancer Research Centre – Queensland and experts in breast, gynaecological cancers, lung and head and neck cancers.

The recent establishment of the Queensland Centre for Drug Target Screening and Characterisation at TRI enables advances in the research, adding to collaborative partnerships and driving clinical outcomes. A state-of-the-art holographic microscope was installed using a grant from the William & Hilde Chenhall Research Trust for rapid development of new-generation cancer therapeutics.

DKLS02 is designed to switch off the function of hSSB1, a critical DNA repair protein that cancer cells need for survival.

Professor Richard said DKLS02 was unique in that it targeted a common feature of all cancers. 'Cancer cells evade therapeutics and move to different parts of the body by altering their genetic code,' he said.

`The CARP research team conducted initial trials for DKLS02 that showed it blocked the cancer cells from repairing the genetic changes and that resulted in the cancer cells' genetic code falling apart and the cells dying.

`DKLS02 is a first-in-class inhibitor of hSSB1. hSSB1 functions to sense genetic damage in the cell. As cancer cells have 1000-fold more DNA damage than normal cells they can't tolerate the loss of hSSB1. DKLS02 causes the cancer's genetic code to collapse.'

Professor Richard finished 2018 with a win in the MTPConnect two-minute pitch competition as part of the Bridge Program, involving 100 participants taking part in training in the scientific, legal, financial, clinical and regulatory disciplines that contribute to research translation.

The win enabled Professor Richard, who is also IHBI's Chenhall Chair in Cancer Research, to visit Amgen, Merck and Abbvie in late November and early December, with tours of their facilities and meetings with groups leading different aspects of the therapeutics commercialisation process.

## OTHER IHBI INITIATIVES

- The State Government announced a three-year extension of the **Johnson & Johnson Innovation Partnering Office at QUT**, based at IHBI. The office supports the life sciences industry by accelerating commercialisation of health technologies to the market place; emerging pharmaceutical, medical device and consumer healthcare start-up businesses; and researchers across Queensland.
- QUT signed a Memorandum of Understanding with Philips Research, enabling staff exchanges, training projects, joint research projects with IHBI researchers and access to QUT health clinics. Potential activities may include diagnostic screening, radiology solutions, medical robotics, genomics and AI-enabled diagnostics and prognostics.
- **Professor Selena Bartlett** won the pitching competition at Igniter Silicon Valley, pitching her start-up company MiGFiT to 40 prominent investors.
- Funding was provided through the Federal Government's Biomedical Translation Fund in 2018 for venture capital firm OneVentures to invest in the research of QUT graduate and IHBI collaborator **Dr Daniel Timms** to develop artificial heart technology in Australia. OneVentures will invest in BiVACOR, a company Dr Timms founded that is developing the rotary Total Artificial Heart (TAH). Government and private investors will provide more than $2.6 million to OneVentures for investment to develop the external TAH controller. Dr Timms used an operating theatre at IHBI's Medical Engineering Research Facility to assess a prototype of the TAH in 2015, with successful implantation that involved surgeons, engineers and researchers.
- **Associate Professor Leila Cuttle** and **Dr Bronwyn Griffin** secured a Smith and Nephew Industry Grant and an Avita Medical Industry Grant for research in children's burns treatment and prevention.
- **Professor David Atchison** had a successful 2018 as part of his role chairing the Committee MS-024 – Spectacles of Standards Australia. The committee was selected to receive the Outstanding Committee Award at the 2018 Standards Australia Awards.
- **Professor Michael Collins** secured funding from Johnson & Johnson Surgical Vision Inc for a research project that involves the assessment of toric intraocular lenses. The lenses are used to correct the optical errors of hyperopia and astigmatism that reduce the quality of vision after cataract surgery.

# Clinical application

IHBI researchers have a focus on translation of their research to enable better disease prevention, diagnosis and treatment; improved quality of life; and lessening the burden on the healthcare system. Underpinning the focus is collaboration with healthcare professionals, patients and their carers; and co-location at hospitals and specialist institutes to ensure an understanding of clinical impact.

**Image:** Professor Colleen Nelson

**IHBI's Australian Prostate Cancer Research Centre – Queensland (APCRC-Q) is part of two registries that aim to better understand the disease and provide evidence-based feedback on best practice clinical care.**

## Coordinating Principal Investigator for the Prostate Cancer Outcomes Registry – Queensland

APCRC-Q Executive Director Professor Colleen Nelson is the Coordinating Principal Investigator for the Prostate Cancer Outcomes Registry – Queensland (PCOR-QLD), with the aim of achieving the best possible health outcomes for men diagnosed with prostate cancer.

Treatment data was collected from more than 6200 patients at the end of 2018, representing more than 92 per cent of Queensland patients. About 75 per cent of prostate cancer clinicians in the state contributed to the PCOR-ANZ.

The registry is assessing patterns of care, working to reduce variation in treatments and outcomes, improving compliance with best-practice guidelines, identifying factors that predict favourable and unfavourable treatment outcomes and providing information to patients about the risks and benefits of specific treatment approaches.

PCOR-ANZ will provide participating hospitals and clinicians with confidential quality-of-care reports, containing feedback on a set of quality standards to drive improvements in care.

'We want better outcomes for men with advanced prostate cancer as fast as possible.'

## IRONMAN

Professor Nelson leads Queensland research for IRONMAN, an international registry of 5000 men with advanced prostate cancer.

APCRC-Q received Movember funding in 2018 to recruit up to 180 men for Queensland's contribution to IRONMAN.

Details collected for IRONMAN include a man's prostate cancer type, their treatment and what side effects they may experience. The aim is to collect information from 5000 men in nine countries, covering a patient's medical history, treatment information, blood samples and patient reported outcomes.

Professor Nelson said the research aimed to better understand what causes prostate cancer, how to stop or slow its progression and how to provide the best practice care for men affected by prostate cancer.

Countries involved in IRONMAN include Canada, the US, Brazil, Ireland, the UK, Sweden, Switzerland, South Africa and Australia.

'The strength of IRONMAN lies in its strong global partnership with patients, their families, doctors and researchers,' Professor Nelson said.

'By reaching everyone on a global scale, we will be able to understand more of the nuances in care in different countries that result in better patient outcomes. The project will start with nine countries, and expects to include more countries in the coming years.'

The global partnerships will enable researchers to assess whether specific treatment patterns are associated with improved survival, reductions in medical events such as hospitalisation, cardiovascular events, bone fractures and improvements in treatment side effects.

They will also aim to identify associations between treatment sequences or combinations with overall survival; identify unmet patient needs in treatment; identify clinical and molecular subtypes that predict how men respond to treatment patterns; and understand decision-making that underlies changes in treatments.

'We want better outcomes for men with advanced prostate cancer as fast as possible,' Professor Nelson said. 'IRONMAN will provide a rapid understanding in areas such as treatment, decision-making, and patient experiences.'

Ultimately, the research aims to build an evidence base for planning randomised trials to test optimal treatment patterns and sequences that improve outcomes and identify new molecular markers that will improve outcomes for men with advanced cancer.

A blood biorepository has been established for all men in the registry, with specimens collected at patient enrolment and again at the first treatment change or at the one-year follow-up. Specimens will be collected, processed and stored as plasma, cell-free DNA and RNA for potential future biomarker studies.

Patients will report on their quality of life using validated questionnaires on the online platform TrueNTH, covering physical and emotional health, fatigue, pain, sleep, depression, anxiety, memory, cognition, urinary and sexual health.

TrueNTH is an international program with Movember Foundation support to improve prostate cancer experiences for men, their partners and caregivers in a collaboration with doctors, researchers and volunteers. IHBI Distinguished Professor Patsy Yates is part of the collaboration.

- Federal Minister for Aged Care Ken Wyatt AM launched End of Life Directions for Aged Care (ELDAC) Phase 2, comprising new partnerships, technology innovation and policy roundtables, to equip health service providers and build capacity in the aged care sector. The ELDAC Project Director is IHBI **Distinguished Professor Patsy Yates**.
- **Professor Yates** also launched the new National Palliative Care Standards and Palliative Care Service Development Guidelines at Parliament House with Palliative Care Australia in February, helping decision-makers and service providers to focus on an important part of the healthcare system.
- **Professor Theresa Green** was part of a collaborative team that received a Metro North Hospital and Health Service (MNHHS) SEED grant. The collaboration between QUT experts in nursing and computer-human interaction; MNHHS IT and stroke units; and the Stroke Foundation is developing an application to enable a stroke survivor, their family and clinical staff to tailor care.
- Researchers at IHBI's Australian Centre for Health Services Innovation (AusHSI) were recognised at the MNHHS Research Excellence awards. **Maree Raymer** and **Tracey Comans**' Physiotherapy Screening Clinic Research Team won the Health Services and Implementation Research Award; and **Adjunct Professor Louise Cullen** won the Chief Executive's Award for her work in changing practice in emergency departments. **Adrienne Young** and the Royal Brisbane and Women's Hospital Nutrition and Dietetic team were highly commended in the Complex Health Challenges Award category; along with **Clare Burns** and the Speech Pathology-led Telehealth services research team.
- AusHSI senior research assistant **Carla Shield** was recognised as an Accredited Research Manager (Foundation) with the Australasian Research Management Society, joining AusHSI colleague **Alison Farrington** in being recognised.

# Excellent facilities for translating research

IHBI facilities and researcher placement at strategically important locations combine to enable advances in scientific discovery and progress towards commercialisation and clinical application. State-of-the-art equipment is matched with transdisciplinary teams of researchers, engineers and clinicians.

**Image:** Associate Professor Makrina Totsika

## Overcoming antibiotic resistance among bacterial infections

Access to specialised cell culture suites, equipment rooms and a cell imaging suite enables Associate Professor Makrina Totsika to advance her research into overcoming antibiotic resistance among common bacterial infections such as cystitis and diarrhoea.

The research received significant acknowledgement in 2018, including the Frank Fenner Award from the Australian Society for Microbiology in recognition of Associate Professor Totsika's distinguished contributions to microbiology research. She was also elected a Fellow of the Australian Society for Microbiology.

Associate Professor Totsika is part of an IHBI research program working in infection and immunity that is benefiting from significant IHBI investment as part of the 2016 relocation to QIMR Berghofer. An Ian Potter Foundation grant of $128 000 also supported equipment purchases during the relocation.

Relocation to the Royal Brisbane and Women's Hospital (RBWH) campus at Herston is also facilitating collaboration with clinicians and providing access to patients and their samples.

Associate Professor Totsika is collaborating with urologists, surgeons, clinical nurses and infectious diseases clinicians from RBWH and Redcliffe Hospital to advance understanding of infections caused by multidrug resistant bacteria and to develop new effective solutions for preventing and treating them.

Her placement within QIMR Berghofer has also resulted in new collaborative partnerships with infection immunologists, catalysed by strategic seed funding from IHBI in 2018.

Associate Professor Totsika is developing a novel class of antimicrobials that disarm harmful bacteria, called pathogens, by targeting their virulence factors rather than killing them, as antibiotics usually do. Virulence factors are known to be involved in determining a pathogen's ability to cause disease.

'Because antibiotics are designed to kill pathogens or stop their growth, their use inevitably selects for bacteria in the population that contain natural genetic changes that allow them to grow in the presence of the drug,' she said.

'Resistance is a natural phenomenon as old as bacteria but antibiotic overuse and misuse has led to the alarming rates of resistance we see today.'

Antibiotic resistance, when bacteria change and antibiotics fail, results in more than 700 000 deaths each year and by 2050 deaths will increase to 10 million annually.

Facilities to support Associate Professor Totsika's research at QIMR Berghofer include five specialised culture suites, two equipment rooms housing high-speed centrifuges, a dedicated qPCR suite and an Ian Potter Foundation Cell Imaging suite.

'The facilities available to me for my research are exceptional,' she said. 'Beyond the equipment, support from IHBI includes technical support from laboratory technicians, maintenance and ancillary services.'

Associate Professor Totsika is using the support of a National Health and Medical Research Council (NHMRC) Project Grant, an Australian Research Council (ARC) Discovery Project grant and a Ramaciotti Foundations Health Investment Grant to focus her research on a pathogen's adherence.

Adherence is a critical first step in the infection process. Adhesins are cell-surface appendages of bacteria that enable adherence to other cells or to a body's surfaces.

'My work has already significantly advanced our understanding of bacterial adherence. The knowledge is now guiding us in developing novel anti-adhesion therapeutics that can block bacterial adherence.'

Associate Professor Totsika's research is expected to lead to next-generation antimicrobials that will be tailored to each patient's infection, slow a pathogen's resistance and prevent disruption of a person's commensal flora, micro-organisms found on body surfaces that are harmless and often form a mutually beneficial relationship with hosts.

## Comprehensive genetic sequencing for cancer patients

Researchers at the Australian Translational Genomics Centre (ATGC) reached a milestone in 2018, conducting comprehensive genetic sequencing for 500 patients in a year at the Princess Alexandra Hospital. Sequencing genetic mutations in blood cancer DNA provides personalised information about the make-up of each cancer and aids clinicians in determining the best treatments for individual patients.

The ATGC is a partnership between QUT, Pathology Queensland and Metro South Hospital and Health Service, with the DNA testing service available for Metro South patients.

QUT Director of Genomics and ATGC Director, Distinguished Professor Matt Brown, said the new testing was far ahead of genetic cancer testing presently available and he hoped to see Queensland Health roll out the testing across the state.

ATGC services to Metro South include genomic investigational methods such as whole-exome and genome DNA sequencing, RNA sequencing, SNP, microarrays and panels.

National Association of Testing Authorities (NATA) accreditation means the ATGC has met stringent quality and competence guidelines for medical and pathology laboratories.

## 3D printing in medicine and health care

Research in 3D printing in medicine and health care was boosted in 2018 with the launch of the Australian Research Council (ARC) Industrial Transformation Training Centre in Additive Biomanufacturing at IHBI.

Under the direction of Distinguished Professor Dietmar W Hutmacher, the centre is a collaboration of five Australian universities, the Shanghai Institute of Ceramics, St Vincent's Hospital in Melbourne and medical industry partners.

'The centre is focussed on developing the next generation of additive biomanufacturing technology and training the future leaders of this field,' Professor Hutmacher said. 'Each of the centre's PhD candidates and post-doctoral researchers is working with an industry partner and an academic expert in the field so that we can bring these findings from bench to bedside quickly.'

### Medical Engineering Research Facility

MERF further upgraded its medical imaging capabilities for surgical skills training and preclinical research in 2018, acquiring a second state-of-the-art C-arm/fluoroscopy device. Significant building investments were made to further improve MERF's preclinical research activities. The Body Bequest program received more than 80 donors, making an important contribution to QUT research, teaching and surgical and paramedic training.

### Translational Research Institute

IHBI researchers at TRI had a successful year. Establishment of the Queensland Centre for Drug Target Screening and Characterisation will enable advances in research, add to collaborative partnerships and drive clinical outcomes. A state-of-the-art holographic microscope was installed using a grant from the William and Hilde Chenhall Research Trust, enabling rapid development of therapeutics for cancer. IHBI, QUT and Metro South Hospital and Health Service provided funding for an Illumina NovaSeq sequencer for the Australian Translational Genomics Centre, reducing cancer sequencing costs while increasing capacity.

### Centre for Children's Health Research

Success at CCHR included industry and community support from the Clipsal Community Grants Program, a Smith and Nephew Industry Grant and Avita Medical Industry Grant for research in children's burns treatment and prevention. The Biomechanics and Spine Research Group received support through a Roland Bishop Bequest and an IHBI large Equipment grant for a Robotic Musculoskeletal Simulator. Professor Janet Davies secured National Foundation of Medical Research Innovation support, with $100 000 for a project in point of care diagnosis for hay fever and asthma.

### QIMR Berghofer

**Associate Professor Makrina Totsika** was elected Fellow of the Australian Society for Microbiology. **Dr Francesca Frentiu** received a carer's grant from the European Society for Evolutionary Biology to attend Evolution 2018. PhD candidate **Badal Madiththegedara Chamini Randika** was awarded a research grant from the Royal Society for Tropical Medicine and Hygiene.

# Capability building

IHBI is creating critical mass, strengthening transdisciplinary research teams and focusing on clinical impact through strategic appointments made in 2018. The institute provides significant support to enable our best minds to advance their research, including skills training in commercialisation in therapeutics and medical devices.

## Strategic Research Fellowships

IHBI offered Strategic Research Fellowships in 2018 as part of an investment strategy for achieving research excellence, while demonstrating support for early- and mid-career researchers.

The fellowships were established to attract and retain highly motivated postdoctoral and senior researchers with interests strongly aligned to areas of strength in the institute. The fellowships will build capacity in targeted areas; help to underpin the future research aspirations for IHBI and QUT; help to develop collaborations with national and international partners; and deliver impact in healthcare.

### Dr Oscar Oviedo-Trespalacios

Dr Oscar Oviedo-Trespalacios is an expert in promoting safety in transport, including the prevention of human error and misuse of technology.

He is leading a project aiming to reduce the potential adverse effects of distracted driving. Road safety policies based on stopping mobile phone use while driving have shown little success and distraction is predicted to be a more significant issue in new semi-automated vehicles.

The new research will develop new technologies, with the ultimate aim of reducing deaths and serious injuries, while also providing significant cost savings to the health system and the community.

### Dr Susanna Cramb

Dr Susanna Cramb is a statistician and epidemiologist with a research focus on chronic disease inequities, recognising that they are the biggest challenge to Australia's health. Chronic conditions account for 61 per cent of the disease burden, 37 per cent of hospitalisations and 87 per cent of deaths. Her project focuses on cancer and diabetes, using a range of data sources and specialised statistical methods to gain a greater understanding of chronic disease development, management and inequities.

### Dr Divya Mehta

Dr Divya Mehta is a molecular geneticist and biostatistician, leading statistical analyses of genome-wide genotypes, gene expression, epigenetic, sequencing data and brain imaging data to uncover the biological mechanisms underlying psychiatric disorders such as post-traumatic stress disorder and depression.

Dr Mehta's research involves understanding how genes interact with environmental factors such as stress to drive risk or resilience to psychiatric disorders in high-risk populations including veterans, paramedical students and pregnant women.

Advanced knowledge gained from the research can be translated into risk prediction, diagnosis, timely intervention, personalised treatment and public health policy, with implications for health and wellbeing.

### Dr Mark Adams

Dr Mark Adams is investigating a treatment for non-small cell lung cancer. His aim is to determine if specific proteins found in the body indicate the presence of the disease and can act as an accurate diagnostic tool.

Ultimately, Dr Adams aims to improve health outcomes for patients who do not respond to certain chemotherapy treatments, using unique patient cohorts and innovative culture methods to enhance patient sensitivity to therapy.

## IHBI Postgraduate Scholarships

IHBI Postgraduate Scholarships were also offered in 2018, with three to support PhD candidates in Health and another in QUT's Science and Engineering Faculty. One of the Health scholarships is the John Williams Cancer Research Scholarship, in recognition of the importance of providing support in an area of QUT research strength.

Murari Bhandari was awarded a scholarship to support a research project entitled *Genomic and virulence studies of Vibrio cholerae O1 in Queensland, Australia*.

The project will examine and characterise a large collection of the bacterium *Vibrio cholera*, found in Queensland waterways. Bacterium isolates present a potential disease risk to the community, with genomic information and characterisation needed to better inform public health authorities and ensure appropriate control measures.

Jasmine Connell was awarded a scholarship to support the project *Evaluate the suitability of whole mtDNA genome comparison across multiple generations for identification of historical military remains*.

The focus of the research is to determine whether multigenerational mitochondrial genome sequencing can be used to identify historical military remains and support establishment of international guidelines for human identification.

Jacob Skewes was awarded a scholarship to support the project *Biofabrication for Orthopaedic and Soft Tissue Implants*.

He is investigating orthopaedic and muscoskeletal implants using cutting-edge 3D metal and composite printing technology. The research will produce personalised implants that aim to mimic natural antibacterial surfaces and promote mechanical and biological integration.

Amir Hassan Entezam was awarded the John Williams Cancer Research Scholarship to support the project *Optimization of irradiation parameters required to improve the efficacy of radiation-immunotherapy combination*.

The project will focus on introducing a well-defined protocol for radiotherapy for future preclinical models, providing for a better understanding of biological processes and molecular mechanisms in response to radiotherapy.

- IHBI had a central role in the **BridgeTech Program**, launched with funding from MTP Connect, QUT and consortium partners in April 2018 to combine face-to-face, online and blended learning technologies to enable the commercial development of medical technology and devices. BridgeTech involved 80 researcher participants from across the country in the medical device and diagnostics sector in 2018.
- IHBI continued to play a central role in the **Bridge Program**, rolled out to a second cohort of researcher participants in 2018 using MTP Connect and industry matched funding. The funding supported the development of the program and enabled QUT and IHBI to lead a consortium of industry partners and research institutes in providing commercialisation training for the pharmaceutical sector.
- **Professor Derek Richard** won the MTPConnect pitch competition as part of the Bridge Program. He was one of four winners invited to visit Amgen, Merck and Abbvie for tours of their facilities and meetings with groups leading different aspects of the pharmaceutical commercialisation process.


# Higher Degree Research support

Research skilling, mentorship and the opportunity to travel to collaborate and to present research findings are part of the higher degree research student experience at IHBI. Students are embedded in transdisciplinary teams and are provided significant opportunities to build collaborative networks and develop a successful career in research.

**Image:** Naomi Paxton

PhD candidate Naomi Paxton had a successful 2018, winning a major award, securing a competitive national travel grant and advancing her skills in a multidisciplinary area of research. She also used her presentation, mentoring and engagement skills to promote research and careers in science, technology, engineering and mathematics (STEM).

Ms Paxton received the Women in Technology (WiT) Life Sciences Young Achiever Award, recognising her research achievements, community engagement and ambassadorship as a role model for women in STEM.

At the same awards night, her IHBI supervisor Professor Mia Woodruff was the recipient of the 2018 WiT Life Sciences Research Leader Award, in recognition of a significant contribution to Queensland life sciences industries, research and development.

'My project is led by two world-leading and inspirational female scientists – Professor Woodruff and Professor Molly Stevens,' Ms Paxton said. 'Mia is a role model for aspiring female scientists and engineers, empowering young women like myself to succeed in STEM disciplines, challenging gender inequality and creating diverse and dynamic work places.'

As part of the Biofabrication and Tissue Morphology research group, Ms Paxton uses medical 3D printers to create patient-specific implants to treat bone trauma or congenital defects.

'The gold-standard treatment for significant bone loss is autografting and allografting,' she said. 'Bone is taken from the hip or another site on the patient's body – or from a donor – and transplanted into the defect site to guide healing.'

There is a major shortage of donor material and grafting procedures are costly and carry significant risks, including infection.

'The aim of my research is to provide an alternative to grafting by 3D printing patient-specific scaffolds containing the patient's own cells, encouraging regrowth and healing. The entire scaffold ultimately dissolves in a safe way.'

‘Conducting the research at IHBI means I have access to world leaders in the field of biofabrication and enables me to rapidly advance my career.’

Drawing on her skills in biomedical physics, Ms Paxton is investigating a biomaterial comprising a synthetic polymer and bioactive glass material that mimics the composition of natural bone. She has developed mathematical models that predict the behaviour of materials during 3D printing to ensure suitability and biological functionality.

Ms Paxton secured a CSIRO Alumni Scholarship in Physics in 2018 to travel to London to work in the world-class laboratories of Professor Stevens at Imperial College London. She learnt advanced imaging techniques to characterise the composite biomaterial at the core of her research.

Travel supported through the scholarship enabled her to visit the laboratories of international collaborators at Utrecht University in the Netherlands and the National University of Singapore.

Funding for her research comes from the Australian Research Council’s Industrial Transformation Training Centre in Additive Biomanufacturing, based at IHBI, with Melbourne medical device company Anatomics as an industry partner.

Support from the centre opens doors to collaborate with researchers such as biomaterials, biomechanics, medical devices and tissue engineering expert Distinguished Professor Dietmar W Hutmacher.

‘Conducting the research at IHBI means I have access to world leaders in the field of biofabrication and enables me to rapidly advance my career,’ Ms Paxton said. ‘There is support to help me build a collaborative network and hone skills outside the laboratory as well.’

Ms Paxton completed her Master of Applied Science under Professor Woodruff’s supervision as part of QUT’s Dual International Biofabrication Master’s Program, with a year of work in a world-leading laboratory at the University of Würzburg in Germany.

Since starting her PhD, Ms Paxton has been named the national winner of a Women in STEM Prize, been awarded two PhD scholarships to support her IHBI research and has secured $28 000 in travel funding to further her collaborative research and networks.

She engaged with more than 3000 students from more than 40 schools across Queensland as part of the QUT STEM for Schools and Wonder of Science programs and was involved in Robotronica in 2015 and 2017, with about 20 000 people visiting QUT for a one-day robotics showcase.

Ms Paxton was also heavily involved in providing a voice to the IHBI student body, as a member of the IHBI Postgraduate Committee in 2015, 2017 and 2018 and was the Master of Ceremonies at the student conference IHBI Inspires for each of those years.

- PhD candidate **Suzie Harte** was the recipient of the 2018 Jean Ferguson Memorial Award for Early Childhood Education, recognising her studies into children’s mealtimes in early childhood education and care centres. She plans to use the award to extend research from her PhD to investigate parents’ perceptions of mealtimes in centres.
- **Tharushi de Silva** received a scholarship at the Prince Charles Hospital Foundation research awards to investigate markers of lung transplant rejection.
- **Fei Wei** won best student oral presentation and **Alvaro Sanchez** won best poster at the Australasian Society for Biomaterials and Tissue Engineering conference In Perth in April.
- **Anisa Rowhani-Farid** was a national finalist in FameLab, the world’s biggest science communication competition. She presented her research on promoting a culture of open science and data sharing to more than 700 people in Perth, including Nobel Laureate Barry Marshall. Presentations were limited to three minutes, with judges scoring for content, clarity and charisma.
- **Jana Panchadsaram** was selected for the People’s Choice poster award at the Australian Society for Medical Research Queensland conference.
- IHBI had three winners at the Princess Alexandra Hospital Health Symposium, with **Farhana Matin** winning the best oral presentation student award, **Jana Panchadsaram** receiving the best poster student award and **Shubhra Chandra** securing the people’s choice prize for best poster.

# Early- and mid-career researcher support

Outstanding early career researchers at IHBI are conducting important research, collaborating widely and securing competitive national funding. Support and mentoring is building their skills and capabilities as future leaders.

**Image:** Dr Arutha Kulasinghe

Dr Arutha Kulasinghe is establishing a successful research career through collaboration with experts in translational oncology and liquid biopsy, as well as the support of significant national competitive funding.

Dr Kulasinghe is funded through a National Health and Medical Research Council (NHMRC) Peter Doherty Biomedical Early Career Fellowship to profile circulating tumour cells (CTCs) and circulating tumour DNA to provide information about a patient's tumour.

The research aims to use information about tumour dynamics to predict a patient's likelihood of responding to targeted immunotherapies and the benefit of the treatment. Using a simple blood test reduces the burden on healthcare providers and offers better treatment options for patients.

'The approach is ground-breaking,' Dr Kulasinghe said. 'Neither patient nor healthcare funders can afford to use drugs that are unlikely to be effective. Targeting treatment to those likely to achieve the greatest benefit is an absolute must.'

Key to the research is mentoring from IHBI Professor Ken O'Byrne and Associate Professor Chamindie Punyadeera.

Professor O'Byrne is an internationally recognised expert in lung cancer biology with involvement in leading clinical trials. He is the Clinical Director of IHBI's Cancer and Ageing Research Program (CARP), established at the Translational Research Institute (TRI) to bring together scientists, clinicians and surgeons from around the world to work towards a universal cancer treatment.

Most cancer research looks for mutations in genes. CARP researchers are taking a step back and looking at the fundamental core of all cancers: genetic instability. Investigating the genetic code enables identification of genes that do not change when cancer develops, allowing the disease to progress and survive.

CARP is unique in Australia in the ability to advance research in the laboratory, to clinical trials and to treatment at the one campus. The TRI laboratories are at the Princess Alexandra Hospital (PAH) campus to facilitate collaboration with healthcare professionals; and co-located with 120 IHBI researchers in areas such as prostate, breast, ovarian, endometrial and lung cancers; and DNA damage repair.

Associate Professor Punyadeera heads IHBI's Saliva Research Laboratory, with a focus on non-invasive diagnostics. Her expertise is based on a career that has involved roles in industry and academia.

The laboratory's researchers work closely with clinical partners at the Princess Alexandra and Royal Brisbane and Women's hospitals, providing access to patient samples to ensure the work has clinical relevance and the potential for translation.

Dr Kulasinghe completed his PhD under the supervision of Associate Professor Punyadeera and Australian Prostate Cancer Research Centre – Queensland Executive Director Professor Colleen Nelson.

The studies involved developing methodologies to capture, expand and profile CTCs, responsible for 90 per cent of cancer-related deaths. It led to 13 publications, with the majority in leading oncology journals, and presentations at 28 national and international conferences.

Dr Kulasinghe was recognised for the significance of the work, being named the Researcher of the Year at the 2017 PAH Research Excellence Awards.

Support was provided for Dr Kulasinghe to visit laboratories at the University of Hamburg-Eppendorf in Germany and the University of Technology Sydney.

Since completing his PhD and starting his postdoctoral work, Dr Kulasinghe has been the recipient of an Advance Queensland Fellowship (declined) and a TRI Spore Grant with industry collaborator Agena Biosciences.

'I have eagerly started my postdoctoral position at IHBI to realise my career goal of translating my lab-based solutions for clinically unmet needs,' Dr Kulasinghe said.

'I have eagerly started my postdoctoral position at IHBI to realise my career goal of translating my lab-based solutions for clinically unmet needs.'

'IHBI and TRI provide the best environment to undertake my research project; and support my scientific development with training that has translation and clinical impact as a focus.'

Dr Kulasinghe's NHMRC funding will support a period of research with leading circulating biomarker researchers Professor Min Yu and Professor Peter Kuhn at the University of Southern California in the US.

Working closely with Professor O'Byrne will open doors to national and international collaborators in different scientific disciplines.

'I will be able to expand my track record, build international collaborations and establish myself as an independent researcher in translational oncology. I aim to work at the interface of scientists and clinicians in an area of immune-oncology that has been acknowledged as being vital to improving survival in cancer patients.'

- **Dr Lisa Stafford** was awarded an Australian Research Council (ARC) Discovery Early Career Researcher Award, with $383 960 for a project entitled *Inclusive community planning for people with disabilities in regional areas*.
- IHBI secured five Advance Queensland Industry Research Fellowships for early-career researchers. Recipients included Dr Kulasinghe, **Dr Elizabeth Martin** *(Patient-reported outcomes and cost-effectiveness of innovations within Queensland maternity services)*, **Dr Mark Allenby** *(Biofabrication for Personalised Vascular Surgery Prognosis, Training, and Treatment)*, **Dr Sean Powell** *(Biofabrication – 3D Biomedical Treatments for Better Health Outcomes for Queensland)* and **Dr Asha Mathew** *(Biofabrication for Orthopaedic and Soft Tissue Implants)*
- IHBI also secured three Advance Queensland Industry Research Fellowships for mid-career researchers, with support for **Dr Laura Croft** *(Towards the clinic: development of a new cancer therapeutic)*, **Dr Jonathan Ellis** *(Developing a comprehensive pharmacogenomics system to prevent adverse drug reactions)* and **Dr Neha S Gandhi** *(Advanced molecular design of potent chemotherapeutic agents)*.
- **Paul Dunn** was the recipient of a National Health and Medical Research Council (NHMRC) Dora Lush Biomedical Postgraduate Scholarship, with $88 502 for a project entitled *Identifying New Genes and Genetic Factors Causing CADASIL and related Stroke and Vascular Dementia Disorders*.
- **Dr Indira Prasadam** received the Young Investigator Award to attend the 2018 Osteoarthritis Research Society International World Congress in Liverpool in the UK, presenting research entitled *Effects of Dietary Saturated Fatty Acid Consumption on Cartilage Health and Trauma-induced Osteoarthritis*.
- **Dr Yinghong Zhou** secured a CASS Foundation travel award to attend the 96th General Session of the International Association for Dental Research in conjunction with the IADR Pan European Regional Congress in London in the UK, presenting her research.
- **Dr Luisa Roeder** was provided the opportunity to attend the Postdoctoral Research Opportunities Week at Technische Universität Munchen in Germany, enabling her to network with key researchers to further develop her postdoctoral work on the neural control of movement and particularly the interaction between cortical activation and muscle activation during locomotion.

# Contributing to the public good

IHBI researchers established a miniature air quality sensor network, shared real time data online and worked with high school students as part of a research project during the Gold Coast Commonwealth Games in 2018.

**Image:** Professor Lidia Morawska

Researchers from the International Laboratory in Air Quality and Health (ILAQH) conducted the project with QUT support through a 2017 Engagement Innovation Grant, as well as the Queensland Department of Environment and Science and the Southport State High School community.

It involved compact, solar-powered units taking readings of airborne particles and carbon monoxide concentrations at sites around the Games Athletes Village. Data was sent via the mobile phone network to a cloud-based management tool for collection and analysis and displayed on an interactive online map.

The project was based on an Australian Research Council Linkage Project and a QUT Engagement Project.

ILAQH researchers were also awarded the Eureka Prize for Infectious Diseases Research in 2018, recognising a state-wide collaboration to uncover the process by which the deadly pathogens causing airway infections are transmitted between cystic fibrosis patients. The research has led to reduced infection rates among cystic fibrosis patients.

ILAQH Director Professor Lidia Morawska said the Gold Coast research project aimed to create an awareness of the importance of air quality and impacts on people's health. 'A person takes about 23 000 breaths a day,' she said. 'That creates the opportunity to inhale pollutants in the air that have a negative impact on a person's health.

'For example, as a shorter-term response, it could trigger an asthma attack; or longer-term impacts such as cancer or heart disease.'

Inadequate air quality is fifth among the biggest risks to people's health, with a Global Burden of Disease assessment estimating that it results in 6.5 million premature deaths each year.

The ILAQH sensors monitored particle and carbon monoxide concentrations in the air, the two key products of combustion sources such as motor vehicles and industry. During inhalation, the particles can penetrate deep into lungs and many studies have shown a causal link between airborne particle pollution and adverse health effects such as respiratory, cardiology and pulmonary conditions.

'Even with the relatively low levels of pollution found on the Gold Coast, exposure for long periods can have health impacts,' Professor Morawska said. 'A recent study conducted in Brisbane showed that airborne ultrafine particles emitted in large quantities from vehicles are associated with systemic inflammation in children, and therefore have deleterious health effects extending beyond the respiratory system.'

High school physics teacher and QUT Masters student Tara Kuhn led Southport students in engaging with different facets of the ILAQH project. The students helped determine where the sensors should be positioned, were involved in data analysis and comparison techniques and both visual comparisons of data and data manipulation.

'The ultimate goal has been to engage students with not only the equipment and data, but to also have them be aware and actively thinking about the quality of air both during the project and after it finishes,' Professor Morawska said.

The project was part of ILAQH's research, postgraduate training and consultancy in the field of air quality and its impact on human health, involving an interdisciplinary team with expertise in physics, chemistry, microbiology, mathematics, public health and engineering.

Facilities supporting the researchers include instrumentation for aerosol generation, mass and number size classification; monitoring of atmospheric gases; real time biological studies; vehicle emission testing, filter testing, lung deposition studies and computer modelling.

- IHBI hosted a program called Dance for Parkinson's, with 17 study participants diagnosed with an early stage of the disease attending classes featuring trained instructors from the Queensland Ballet, volunteer facilitators from IHBI, QUT's Faculty of Creative Industries and Faculty of Health. Families, friends and caregivers were included to foster mutually positive perceptions and relationships. Study findings suggested Dance for Parkinson's could be a useful adjunct management option in the management of motor and non-motor symptoms and play a role in improving emotional wellbeing and quality of life.
- IHBI hosted two Real Health public lectures in 2018, with the first in July attracting about 200 people and featuring researchers discussing genetics, challenges, treatment options and the prospects of halting or slowing dementia and age-associated diseases in the future. A second public lecture was held in October, detailing asthma and respiratory health and featuring IHBI research in the field.
- IHBI's External Engagement Committee (EEC) welcomed new member **Ian Walker**. The EEC provides community engagement and networking opportunities; advocates for IHBI in the community; and cultivates philanthropic and research collaboration opportunities. EEC members and volunteer advocates played a key role in introducing people to researchers in cancer, diagnostic genomics, medical robotics, vision and eye health, exercise and nutrition, health economics, dementia, spine research, biofabrication and virtual reality. Events and laboratory tours featured as a major part of the engagement strategy to connect with existing IHBI supporters, industry partners, trusts and foundations, non-profit organisations and potential philanthropic supporters.
- The 2018 IHBI Gala Dinner in October showcased the institute's research to peers, collaborators, industry partners, clinicians, health administrators and supporters. The event featured a keynote address from MTPConnect Chief Executive Officer **Dr Dan Grant** and reflected on the institute's achievements, partnerships, use of the latest technology and impact on improving clinical practices.
- IHBI researchers were involved in the World Science Festival, with **Professor Damien Harkin** presenting at *Bespoke bodies: The path to human regeneration;* **Professor Derek Richard** at *Chasing longevity: The quest for longer life* and **Distinguished Professor Matt Brown** at *Brainfood breakfast: The talent gene*. **Dr Wendy Miller** presented at Cool jobs in Townsville and Dr Jonathon Peake at Cool Jobs at Chinchilla.
- IHBI's **Dr Joanne Voisey** visited Kedron State School during National Science Week, running an experiment on extracting DNA from strawberries. Her research group was also mentioned in State Government social media posts as part of the A–Z of Queensland science, along with **Professor Rik Thompson**'s team, **Professor Prasad Yarlagadda**, **Professor Mia Woodruff**, **Dr Rachael Murray** and **Dr Francesca Frentiu**.
- **Dr Lee Jones**, from IHBI's Research Methods Group, attended Science Meets Parliament in Canberra. STEM professionals highlighted to politicians the importance of science, technology, engineering and mathematics research to the Australian community.

# Knowledge transfer

IHBI researchers pursue national and international avenues for networking and the transfer of knowledge, including convening of major conferences and presenting their research widely. The initiatives build on IHBI's transdisciplinary focus, ensuring collaboration among researchers and with peers, industry, clinicians and end users.

**Image above:** Dr Rachael Murray

IHBI's Dr Rachael Murray has been recognised for her work in improving the connections between Australian and overseas researchers to improve wound healing.

She was the recipient of the Australasian Wound and Tissue Repair Society's Lifetime Membership Award, bestowed at the society's conference, called Cutaneous Biology and held in 2018 in conjunction with The Molecular and Experimental Pathology Society of Australia and the Australasian Society for Dermatology Research.

The award recognised her commitment and outstanding individual service to the AWTRS and the field of tissue repair. Dr Murray was a founding member, was secretary for seven years and president for six years.

Dr Murray was co-convenor with Professor Allison Cowin from the University of South Australia for the first of the successful biennial AWTRS conferences in Darwin in 2008; and has been conference convenor for conjoint research meetings in 2012 in Sydney, 2014 on the Gold Coast, 2016 in Melbourne and on North Stradbroke Island in 2018.

The meetings attracted speakers from around Australia, the US, Canada, France, Spain, Germany, Switzerland, the Netherlands, the UK, Singapore, Japan, India and New Zealand.

Her passion for helping early career researchers led to the establishment of the AWTRS Young Investigator of the Year Award in 2016, recognising outstanding research achievement and aiming to promote and encourage emerging young investigators in wound and tissue repair. Dr Murray awarded 27 travel awards to the AWTRS conference since becoming president and also awarded national and international travel awards to 20 early-career researchers and students to attend wound-related conferences in Poland, the Netherlands, France, Belgium, Italy, Korea, Hong Kong and the US.

The 2018 meeting included sessions on new approaches for regenerative medicine, wound repair, tissue engineering, stem cell biology, organ regeneration, cancer and ageing, photobiology of the skin, melanoma and inflammation.

Plenary speakers included Professor Phil Stephens from Cardiff University in the UK, detailing the superior wound healing properties of oral progenitor cells in the oral mucosal cavity; and Professor Claudia Wellbrock from the University of Manchester in the UK, covering intra-tumour signalling between melanoma cells and non-tumour cells.

Other international speakers included Dr Magda Ulrich from the Association of Dutch Burn Centres in Amsterdam, the Netherlands; Associate Professor Kim Jensen from the University of Copenhagen, Denmark; Professor Sabine Eming from the University of Cologne, Germany; Dr Imanol Arozarena from Navarrabiomed in Spain; Professor David Granville from the University of British Columbia, Canada; and Professor Chikako Nishigori from Kobe University, Japan.

The program also catered for early-career researchers, with two research sessions, networking event and an opportunity to win poster and presentation prizes. A workshop entitled Developing a Research Track Record on a Shoe String provided key skills for early-career researchers to survive, thrive and develop their track record and create research outputs. A masterclass featured a panel of researchers answering questions and addressing topics related to the theme Pathways to Success.

Dr Murray was one of 12 researchers on the Cutaneous Biology scientific organising committee, joining IHBI's Associate Professor Leila Cuttle and colleagues from the University of Sydney, the University of New South Wales, Curtin University, the University of South Australia, the Telethon Kids Institute and the University of Queensland.

IHBI master's student Zoe West was successful in securing the AWTRS conference travel award, recognising her research entitled *LPS activation induces MMP14 surface delivery via VAMP7/VAMP8-positive late endosomes/lysosomes in macrophages*.

Honours student Olivia McGifford was also among the IHBI achievers, named runner-up for Outstanding Poster Presentation, recognising her research entitled *Creating a three-dimensional human skin burn model using commercially available synthetic dermal replacement matrices*.

- **Distinguished Professor Dietmar W Hutmacher** and **Associate Professor Dale Nyholt** were recognised as 2018 Highly Cited Researchers, placing them among the world's most influential scientists who have demonstrated significant influence through publication of multiple highly cited papers during the past decade. Both researchers were in the new cross-field category, identifying those with substantial influence across several scientific fields.
- IHBI Researchers were included in high profile publications, with five in *Nature Communications* and three in *Lancet* publications.
- **Professor Lidia Morawska** was the only Australian researcher invited to participate in the World Health Organisation's first WHO Global Conference on Air Pollution and Health in Geneva, Switzerland.
- IHBI's **Australia-China Centre for Tissue Engineering and Regenerative Medicin**e hosted the 2018 Australia-China Conference of Tissue Engineering and Regenerative Medicine in Cairns in November. The conference attracted almost 100 people and featured keynote speakers from the Chinese Academy of Sciences, Zhejiang University, the Chinese Society for Biomaterials, the University of Western Australia, RMIT, QUT and the University of Queensland. It provided the opportunity to detail achievements and facilitate collaborations that enable researchers to develop innovative solutions for health issues and make better health a reality.
- **Dr Natalie Pecheniuk** was co-convenor of BLOOD 2018 in Brisbane in October, bringing together the Haematology Society of Australia and New Zealand; the Thrombosis and Haemostasis society of Australia and New Zealand; and the Australian and New Zealand Society of Blood Transfusion. BLOOD 2018 was the premier annual scientific meeting for each of the societies, attracting about 1200 delegates from the medical, pathology, basic research and nursing communities for a program with 16 international keynotes.
- **Associate Professor Chamindie Punyadeera** was the convenor of the Saliva Technology Application Research Symposium in Brisbane, bringing the world's greatest minds to Australia for the second saliva conference to discuss emerging research, technological advances and translation pathways.
- **Professor Ken O'Byrne** hosted the Brisbane Cancer Conference at the Brisbane Convention and Exhibition Centre in November. The conference brought together clinicians, nurses, allied health professionals and scientists for a multidisciplinary translational cancer research forum, attracting about 1000 delegates.
- **Professor Prasad Yarlagadda** was co-chair of the Global Conference on Manufacturing and Management in Brisbane in December, with a focus on sustainable digital manufacturing and its application in areas such as medical implants.
- **Associate Professor Chamindie Punyadeera** was invited to present at the 70th American Association for Clinical Chemistry Annual Scientific Meeting in Chicago in the US, with a focus on innovations in body fluids.
- She also presented at the Next Einstein Forum Global Gathering in Kigali, Rwanda, Africa's premier science and innovation meeting, attracting more than 2000 delegates.
- IHBI researchers presented and chaired sessions at the annual meeting of the Association for Research in Vision and Ophthalmology in Honolulu, Hawaii, the largest gathering of eye and vision researchers in the world, with more than 11 000 delegates from more than 75 countries. **Associate Professor Beatrix Feigl** was invited to present at the ARVO Special Symposium with five other leading international researchers.
- Presenters at the European Wound Management Association Conference in Krakow, Poland included IHBI researchers **Professor Helen Edwards**, **Dr Christina Parker** and **Dr Derek van Lonkhuyzen**; and PhD students **Ut Bui** and **Ann Stewart**.

# Research quality

Funding support from philanthropy, industry, competitive grants and foundations enables research, outputs and translation and enhances research quality.

## Philanthropic funding

A range of individual donors, philanthropic foundations and trusts, and corporations contributed $8.032 million to IHBI research and community service projects. This includes funding from philanthropic gifts and non-profit grants.

Philanthropic and foundation funding in 2018 included contributions from:

- AO Foundation
- AFA Central Pty
- Alzheimers Australia Dementia Research Foundation
- Asthma Australia Incorporated
- Australian Red Cross Blood Service
- Cancer Council Queensland
- CASS Foundation
- Chenhall Research Trust
- Children's Hospital Foundation Queensland
- Cure Cancer Australia Foundation
- Department of Communities, Disability Services and Seniors (Qld)
- Emergency Medicine Foundation Ltd
- Gallipoli Medical Research Foundation
- Gastroenterological Society of Australia
- Gynaecological Cancer Research, Education and Development Society Limited
- Hand Heart Pocket
- Illumina Australia Pty Ltd
- International Myeloma Foundation
- JJ Richards & Sons Pty Ltd
- Kidney Research Foundation Limited
- KUKA Ag
- Life Technologies Australia Pty Ltd
- Lions Club of Sanctuary Cove Hope Island Inc
- Medtronic Australasia Pty Ltd
- Metro North Hospital and Health Service
- Movember
- National Breast Cancer Foundation
- National Foundation for Medical Research and Innovation
- National Heart Foundation of Australia
- PA Research Foundation
- Peter MacCallum Cancer Institute
- Pronto Software Limited
- Prostate Cancer Foundation of Australia
- QIMR Berghofer
- Queensland Community Foundation
- Queensland Health
- Queensland X-Ray
- Ramaciotti Foundation
- RBWH Foundation
- Skin Cancer College
- St Vincent's Hospital Sydney Limited
- St Vincent's Private Hospital Sydney
- St Vincent's Private Hospitals Limited
- St Vincent's Hospital (Melbourne) Limited
- Suncity Sales Pty Ltd
- TESARO Bio GmbH
- The Nicol Foundation
- The Ian Potter Foundation
- The Prince Charles Hospital Foundation
- The Royal Australian College of Physicians
- The Trustee for Defence Health Foundation
- The Trustee for the Chapman Foundation
- The Trustee for the Garnett Passe and Rodney Williams Memorial Foundation
- The Trustee for Translational Research Institute Pty Ltd
- UniSuper Limited
- University of North Carolina
- US Government
- Yarrabee Coal Company Pty Ltd

## Carla Patterson Memorial Grants

The Carla Patterson Memorial Grants were established in memory of Professor Carla Patterson, who dedicated her life to public health research at QUT. The grants continue her legacy by supporting early- to mid-career public health researchers in their professional development.

Recipients of $15 000 grants awarded in 2018 demonstrated the significance and impact of their research in the context of public health. Dr Margaret MacAndrew was awarded for her project entitled *Preliminary item testing of the Safe Walking Assessment and Planning Tool*; Dr Rebecca Byrne was awarded for her project *Understanding how children are fed in the early childhood education and care*; and Dr Cassandra Gauld for *Monitoring/Reading Social Interactive Technology on Smartphones Among Young Drivers*.

***Carla Patterson** was many things to many people throughout her academic life. She was an educator, a researcher, a supervisor and a mentor, a leader, a colleague and a friend. She valued the sharing of ideas and was passionate about supporting the development of new researchers.*

***Through the Carla Patterson Memorial Grants we would like to honour Carla and to continue her legacy by supporting early- to mid-career public health researchers. Ultimately, we hope that the grants will contribute to improvements in health and wellbeing in a wide range of multi-faceted and vital fields of research.***

***Dr Freyr Patterson** April 2019*

## John Williams Cancer Research Scholarship

The John Williams Cancer Research Scholarship was awarded to Amir Hassan Entezam to support his project in a cancer-related research, aiming to improve the efficacy of the radiation-immunotherapy combination.

John Williams was a Kelvin Grove resident who passed away of lung cancer in 2006. In his will, Mr Williams left a bequest to QUT to support research into cancer. QUT has honoured his wishes by establishing a postgraduate research scholarship in his name. The John Williams IHBI Cancer Research Endowment has been established as a perpetual endowment to finance cancer research through IHBI.

## Clayton Adam Florence Wilson Award for Biomechanics and Spine Research

Laura Meszaros was the recipient of the Clayton Adam Florence Wilson Award in 2018, supporting her biomechanics and spine research with $30 000 per annum for three years.

The award honours Professor Clayton Adam's contribution to scientific innovation in spine research. He joined QUT in 1999, dedicated to helping children with spinal disorders and to improving treatment outcomes for patients who undergo spinal surgery.

Professor Adam brought together a dedicated team of researchers, scientists, engineers, surgeons and industry partners to perform cutting-edge research aimed at minimising risks and improving spinal surgery results for patients.

His leadership of the research program resulted in QUT receiving a substantial gift from a donor impressed by his work, resulting in the Florence Wilson Bequest.

Professor Adam was diagnosed with cancer in 2015, but he continued his research during treatment until early 2018. His battle with cancer ended in March 2018, but his dedication and contribution to biomechanics and spinal research will long be remembered.

## IHBI Innovation Ideas Grants

IHBI launched the Innovation Ideas grants in 2018, providing a total of $100 000 for pilot studies or other research purposes for which alternative funding may not be readily available. The grants were established with the support of philanthropic donations to IHBI for non-designated purposes.

Successful research projects aligned with IHBI's priority areas, vision and eye health; cancer; cardiovascular and metabolic health; mental health and neuroscience; and dementia and ageing. They also demonstrated a focus on challenging and shifting paradigms and having a major impact on areas of health research.

The recipients were Associate Professor Scott Read, Dr Audra Shadforth, Dr Edward Ren, Professor Nathan Subramaniam, Associate Professor Makrina Totsika, Dr Sally-Anne Stephenson, Dr Elke Hacker, Dr Jacqui McGovern, Dr Daniel Wallace and Dr Natalie Bradford.

## Funding

IHBI's external funding exceeded $48 million in 2018, representing 50 per cent of QUT's total research income awarded during the year.

The National Health and Medical Research Council (NHMRC) awarded $5 393 407 in competitive research funding and another $3 003 507 came from the Australian Research Council (ARC).

### IHBI research income received in 2018

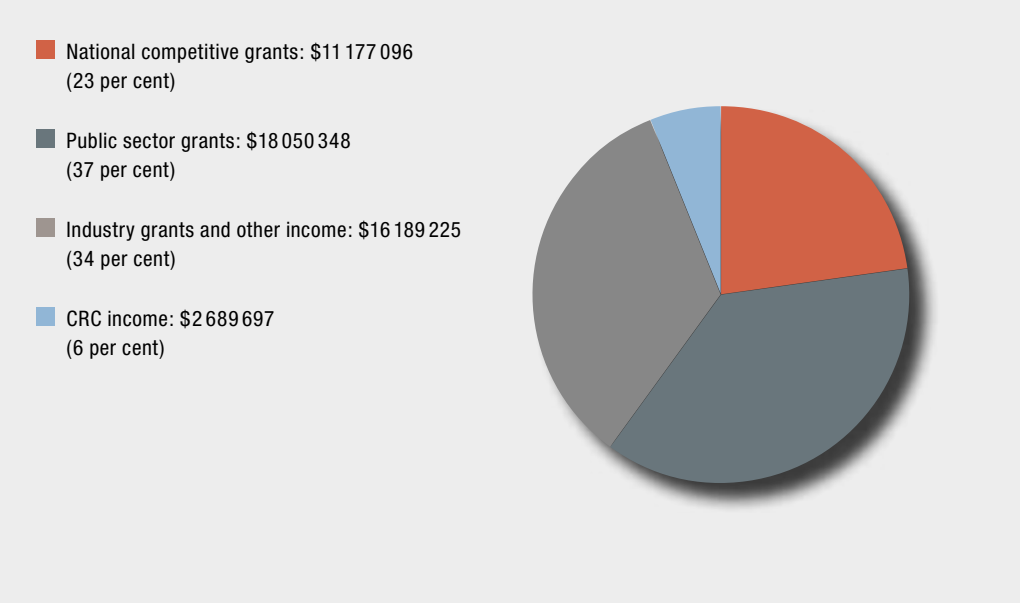


**Figure 1:** IHBI research income received in 2018 (provisional data based on 31 December 2018 figures)

## Attracting HDR students

IHBI hosts 635 higher degree research students from our partner QUT Faculties, providing significant opportunities for HDR student supports and career development programs.

In 2018, 164 higher degree students commenced, 97 completed their studies and 46 were under examination on December 31, 2018. Of the 635 students 36 per cent were international students.

# Publications

IHBI research was disseminated in 844 peer-reviews publications.

### Publications in 2018

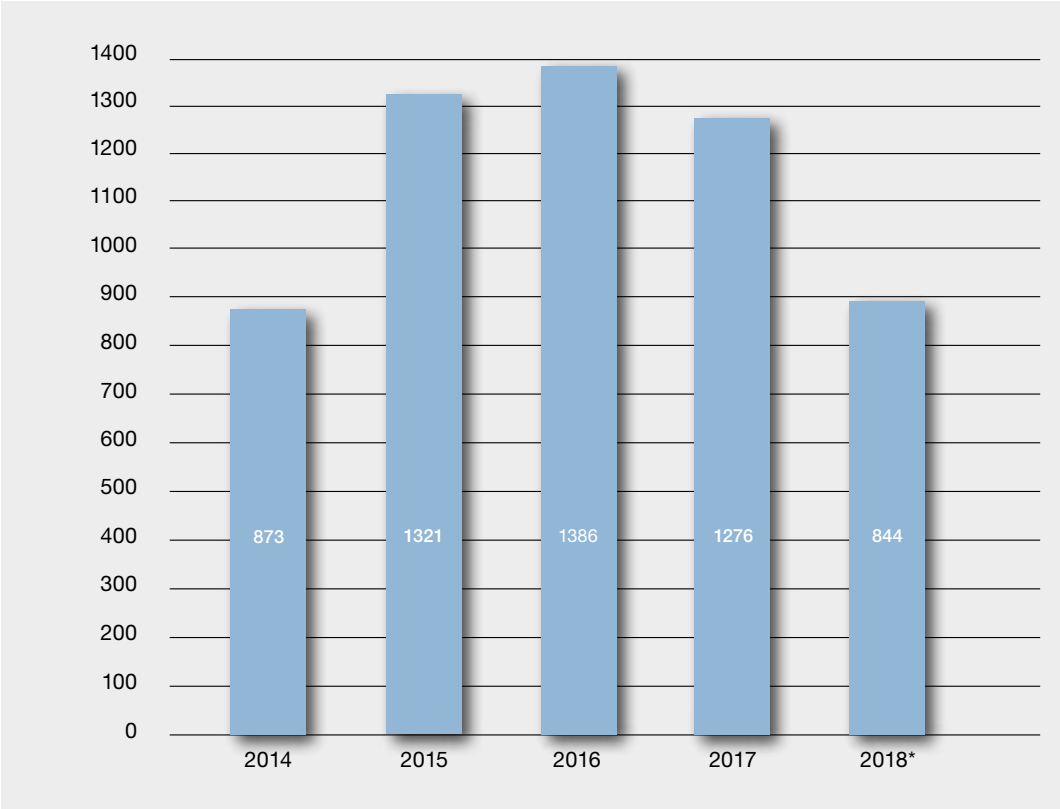


**Figure 3:** IHBI researchers disseminated their research results through peer-reviews journals
* (Provisional data based on 6 February 2019 figures)

# Commercialisation

IHBI brings the benefits of our research to healthcare practice through commercialisation.

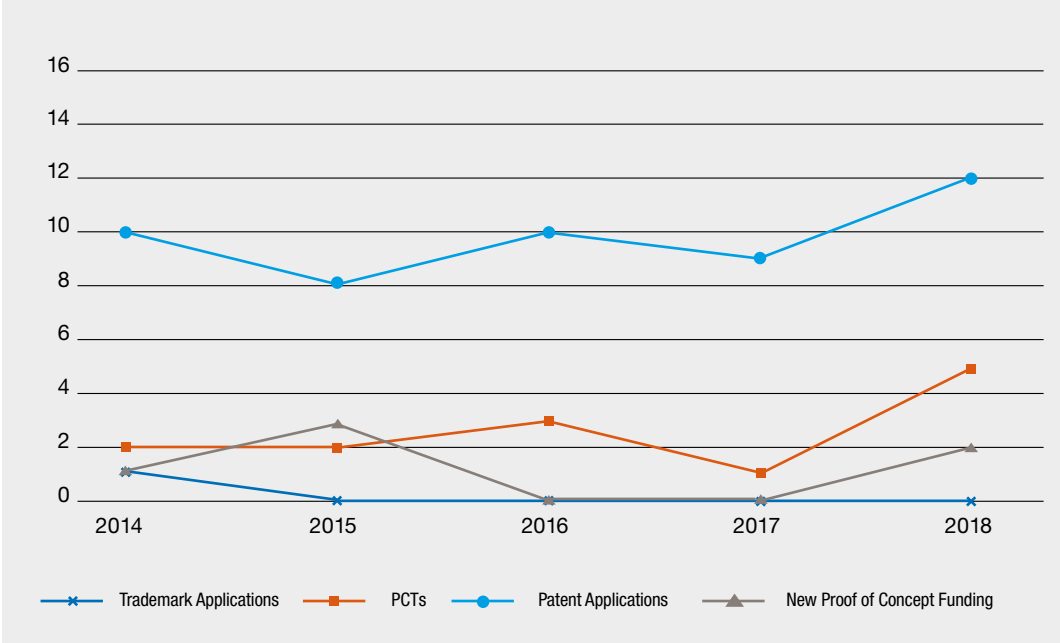


**Figure 4:** IHBI's new proof of concept funding increased from 2017 to 2018

# Appendices

# Research themes

IHBI has three research themes, providing focus, differentiation and critical mass in select areas of significant research strength. The themes encourage cross-disciplinary research, an important factor in creating synergy and creativity. The themes are:

- **Health determinants and health systems**, covering diabetes, mental health, disease prevention and health services research
- **Injury prevention and trauma management**, including arthritis, orthopaedics, musculoskeletal care, tissue repair, biofabrication and road safety
- **Chronic disease and ageing**, covering cancer, dementia, cardiovascular disease, vision impairment and infectious disease.

# Research theme highlights

## Health determinants and health systems

**Theme leader: Professor Neil King**

**Social, environmental and behavioural factors impact on health and wellbeing. Researchers in the theme use molecular, epidemiological, qualitative, health economics and clinical research methods to improve disease prevention, treatment and healthcare delivery and efficacy.**

A multidisciplinary approach within the theme enables research teams to recognise the complexity of health issues and take into account social and societal factors, human behaviour, environmental and genetic risk. A theme strength is the real-world relevance and impact of the research, including the use of technology and innovation to address:

- **Disease prevention:**
  Researchers drive preventative initiatives to reduce chronic diseases such as obesity and cancer.
- **Healthy lifestyles:**
  Strategies to promote healthy lifestyles and prevent disease are based on insights gained about the environmental, social and individual determinants of behaviours, particularly physical activity, diet and sun safety. The theme also has a focus on health outcomes and optimal survivorship.
- **Child and adolescent health:**
  Partnering with families and support services enables researchers to address childhood development, respiratory illness, obesity, nutrition, sleep and prevention of child maltreatment, as well as ensuring equitable health outcomes for all, including Aboriginal and Torres Strait Island children.
- **Mental health:**
  Research encompasses genetics, genomics, pharmacology, behavioural neuroscience, psychology and online interventions to treat people with mental health issues, address addiction and better understand post-traumatic stress disorder.
- **Health services and systems:**
  Using technology and innovation, researchers are working to reduce healthcare costs, provide improved health services, reduce hospital-acquired infection rates and improve patient care and experience.
- **Environmental health:**
  Researchers measure, analyse and determine the health impacts of pollutants, climate, hydration, UV radiation and climate change on people's health and performance.

| Quick facts and figures | |
|---|---|
| **Number of staff** | 254 members |
| **PhD/Masters research students** | 52 higher degree students newly enrolled in 2018.<br>4 Masters by Research, 20 PhD students and 1 Professional Doctorate graduated in 2018<br>(16 domestic and 9 international students) |
| **Research income** | $8 708 816 |
| **Patents** | No patents were filed in 2018 |
| **Research papers published** | 380 research papers published. |
| **Key achievements 2018** | • Adjunct Professor Anne Chang led a successful Children's Hospital Foundation (CHF) Translator grant bid, with $299 440 for a project entitled *Double blind randomised control trial on protracted bacteria bronchitis*.<br>• Associate Professor Julie Marchant was part of a successful CHF Preclinical and Clinical Research Grant (Early Career Fellowship), with $349 549 for the project *Dual centre double blind randomised controlled trial on the utility of personalised bronchiectasis management plans for children with bronchiectasis*.<br>• Professor Chang led a successful bid for a Medical Research Future Fund/National Health and Medical Research Council (NHMRC) Rare Cancers Rare Diseases, Unmet Need grant, with $2.37 million for the project *Improving outcomes of children and young adults with primary ciliary dyskinesia: a multi-centre, double-blind, double-dummy, 2x2 factorial, randomised controlled trial*.<br>• Professor Chang secured $585 270 as part of a NHMRC Practitioner Fellowship bid.<br>• Professor Stewart Trost led a successful bid for a NHMRC Project Grant, with $1 169 557 for *Short and long-term effects of therapeutic exercise in children with bronchiectasis: a multi-centre randomised controlled trial*.<br>• Adjunct Associate Professor Rosana Pacella led a successful bid for a NHMRC Project Grant, with $2 311 217 for *The first national study of child maltreatment in Australia: prevalence, health outcomes, and burden of disease*.<br>• Dr Rebecca Byrne led a successful bid for a Children's Hospital Foundation – Woolworths Nutrition-Related Health Services Research Grant, with $99 645 for *Building capacity of child health nurses to support healthy eating in early childhood education and care settings*.<br>• Professor Lidia Morawska's collaborative research team won the 2018 Eureka Prize for Infectious Diseases Research.<br>• Professor Morawska was invited to participate in the World Health Organisation's Global Conference on Air Pollution and Health in Switzerland.<br>• Professor Morawska was successful in securing NHMRC Centres for Research Excellence CAR Seed Funding for *Assessment of children's exposure to air pollution in Fiji, its drivers and the burden of disease attributable to it*.<br>• Dr Lisa Stafford was the recipient of an Australian Research Council Discovery Early Career Researcher Award for *Inclusive community planning for people with disabilities in regional areas*.<br>• Dr Elizabeth Martin received an Advance Queensland Industry Research Fellowship.<br>• Louise Baldwin secured an Advancing Queensland age-friendly grant to build partnerships with South West Queensland Hospital and Health Service focusing on age friendly health services and ongoing chronic disease prevention and health promotion.<br>• Dr John Paul Cauchi represented QUT at the Asia-Pacific 3 Minute Thesis Competition, presenting details of his research in climate change, food security and health in Kiribati. |

# Injury prevention and trauma management

**Theme leader: Associate Professor Travis Klein**

**Theme researchers develop novel medical technologies and behavioural approaches to promote health, wellbeing and injury prevention, along with treatment and rehabilitation. A multidisciplinary approach ensures teams consider the multitude of molecular, environmental and social risk factors for disease and injury.**

Researchers work collaboratively with clinicians and health practitioners to better understand the needs of patients, people in the community, healthcare workers and support staff. The engagement ensures real-world relevance and research impact.

The researchers use advanced technologies and approaches at world-class facilities including the Medical Engineering Research Facility, the Translational Research Institute, the Centre for Children's Health Research, the Herston Imaging Research Facility and QUT's Central Analytical Research Facility.

Theme strengths and expertise are in biological, behavioural and clinical sciences, biofabrication, biomedical engineering, health technologies and intelligent transport technologies. The strengths are employed in:

- developing novel diagnostics and therapeutics for healing and recovery
- creating new interventions to treat damaged cartilage and reduce arthritis
- encouraging wound healing and functional recovery
- preventing and rehabilitating hamstring injuries among athletes
- studying the functional consequences of injury and disorders of skin and musculoskeletal tissues
- investigating and overcoming workplace health and safety issues
- developing preventative strategies to enhance road safety and reduce injury incidence
- preventing injuries among high-risk groups such as children, adolescents and older people, including predicting falls risk in people with neurodegenerative disease.

The theme has a focus on commercial application, developing new tissue engineering therapies, orthopaedic and rehabilitation devices, and trauma and emergency care management systems based on research.

Researchers are developing e-health technologies to monitor fatigue, balance and falls risk; e-health assessments to monitor patients and inform best practice health care; and wireless technologies to monitor vehicle movements and provide alerts. A technology-inspired environment drives translation of knowledge into products and services.

| Quick facts and figures | |
|---|---|
| **Number of staff** | 201 members |
| **PhD/Masters research students** | 53 higher degree students newly enrolled in 2018<br>10 Masters by Research, 4 Master of Philosophy and 20 PhD students graduated in 2018<br>(18 domestic and 16 international students) |
| **Research income** | $11 862 680 |
| **Patents** | 3 patents were filed in 2018 |
| **Research papers published** | 269 research papers published |
| **Key achievements 2018** | • Associate Professor Leila Cuttle led a successful bid for a NHMRC Project grant, with $1 224 150 for a project entitled *The use of biomarkers in children to predict healing potential and optimise burn wound care*.<br>• Dr Yi-Chin Toh was the recipient of an ARC Future Fellowship, with $723 125 for a project entitled *Modular microfluidic platform for mimicking multi-organ system interactions*. Dr Toh will join QUT and IHBI from the National University of Singapore.<br>• Devakar Epari secured more than $400 000 from an AO Foundation AO Development Incubator to develop his new biphasic plate concept for orthopaedic surgery.<br>• Dr Mark Allenby was the recipient of an Advance Queensland Industry Research Early Career Fellowship for a research project entitled *Biofabrication for Personalised Vascular Surgery Prognosis, Training, and Treatment*.<br>• Dr Asha Matthew secured an Advance Queensland Industry Research Early Career Fellowship for *Biofabrication for Orthopaedic and Soft Tissue Implants*.<br>• Dr Sean Powell secured an Advance Queensland Industry Research Early Career Fellowship for *3D Biomedical Treatments for Better Health Outcomes for Queensland*.<br>• Dr Nicole Bartnikowski was the recipient of a Prince Charles Hospital Foundation Research Fellowship, with $300 000 for *Saving the right heart – How to operate a left ventricular assist device to maintain right ventricular function*.<br>• Distinguished Professor Dietmar W Hutmacher received the 2018 Ramaciotti Medal for Excellence, awarded to a researcher that has made an outstanding discovery in clinical or experimental biomedical research.<br>• Professor Hutmacher was recognised as a 2018 Highly Cited Researcher in the new cross-field category, placing him among the world's most influential scientists who have demonstrated significant influence through publication of multiple highly cited papers during the past decade<br>• Clinical researcher in emergency pre-hospital care, Professor Vivienne Tippett, was acknowledged in the 2018 Queen's Birthday Honours List, awarded a Medal of the Order of Australia (OAM) for her outstanding service to medical education.<br>• The Australian Research Council (ARC) Industrial Transformation Training Centre in Additive Biomanufacturing was launched at IHBI in 2018. Under the direction of Professor Hutmacher, the centre is a collaboration of five Australian universities, the Shanghai Institute of Ceramics, St Vincent's Hospital in Melbourne and medical industry partners.<br>• Professor Michael Schuetz was appointed the Director of the Jamieson Trauma Institute, established to revolutionise and advance trauma care across Australia.<br>• Dr Indira Prasadam received the Young Investigator Award to attend the 2018 Osteoarthritis Research Society International World Congress in Liverpool in the UK, presenting research entitled *Effects of Dietary Saturated Fatty Acid Consumption on Cartilage Health and Trauma-induced Osteoarthritis in Rats* and poster presentation *A MicroRNA Screen Reveals the Critical Role of MicroRNA-23A-3P in Maintaining Cartilage Homeostatsis*.<br>• Professor Mia Woodruff was awarded the 2018 Women in Technology Life Sciences Research Leader Award, in recognition of a significant contribution to Queensland Life Sciences industries, research and development. |

## Chronic disease and ageing

**Theme leader: Professor Nathan Subramaniam**

**Researchers in the theme are developing new ways of understanding, treating and managing chronic conditions and age-related maladies to identify molecular, genetic and environmental contributing factors. They conduct research into molecular mechanisms and genomics of chronic and infectious diseases, as well as vision, palliative and end-of-life care, wellness after cancer, and support for people with dementia and their carers.**

Using state-of-the-art technologies, researchers ensure their work has real-world relevance and impact. A multidisciplinary approach ensures teams recognise the complexity of health issues and take into account social factors, human behaviour and genetic risk. Theme strengths are:

- biomedical science and molecular modelling expertise to understand disease behaviour and progression
- a focus on detecting genes and organisms involved in chronic disease susceptibility and progression
- expertise in advanced nursing research, based on direct links with hospitals, community services, residential aged care facilities and carers
- expertise in palliative care best practice
- the links between nutrition, exercise and wellness after disease; and with ageing
- a focus on the multiple facets of cancer, from genetic and biological studies dealing with onset and early diagnosis, to helping people live healthy lives following treatment
- work at the Australian Prostate Cancer Research Centre – Queensland to improve clinical management; develop diagnostics, therapeutics and treatments; and study biomarkers
- collaborative efforts across several cancers (prostate, breast, gynaecological cancers, lung, head and neck cancers) and neurological diseases (migraine and stroke) for better diagnostics and therapeutics; and hosting of QUT's Breast Cancer Research Network
- expertise in genomics, including DNA diagnostics and a dedicated clinical trials site available through the Genomics Research Centre
- pioneering work in offering Queensland's first genomic diagnostic service at the Australian Translational Genomics Centre, enabling rapid and comprehensive screening for cancer mutations
- multidisciplinary approaches to cardiovascular disease
- expertise in vision research focusing on diagnosis, assessment and treatment development of ocular and vision disorders
- critical mass in infectious disease, including international recognition for chlamydia research, clinical trials for a Ross River virus vaccine and state-of-the-art molecular techniques for rapid diagnosis of bacterial infections
- a leading role in the Dementia Collaborative Research Centre, working to enhance assessment and care of people with dementia.

| Quick facts and figures | |
|---|---|
| **Number of staff** | 327 members |
| **PhD/Masters research students** | 59 higher degree students newly enrolled in 2018.<br>9 Masters by Research, 3 Master of Philosophy, 25 PhD students and 1 Professional Doctorate graduated in 2018 (23 domestic and 15 international students) |
| **Research income** | $27 534 870 |
| **Patents** | 9 patents were filed in 2018 |
| **Research papers published** | 320 research papers published |
| **Key achievements 2018** | • Associate Professor Andrew J Zele was awarded an Australian Research Council (ARC) Future Fellowship, with $988 541 for a project entitled *Vision and lighting in the age of melanopsin*.<br>• IHBI secured three ARC Discovery Project grants. Professor Lyn Griffiths led a successful bid, with $590 000 for a project entitled *Characterising inheritance patterns of whole genome DNA methylation*. Professor David Atchison led a successful bid, with $425 000 for *Relationship of retinal directionality to human retinal anatomy variations*. Professor Joanne Wood led a successful bid, with $399 458 for *Using visual science to reduce the dangers of night driving*.<br>• Associate Professor Tony Kenna led a successful bid for a National Health and Medical Research Council (NHMRC) Project grant, with $576 807 for a project entitled *Evaluation of a new therapeutic strategy for treatment of systemic sclerosis and systemic lupus erythematosus*.<br>• Dr Arutha Kulasinghe secured a NHMRC Peter Doherty Biomedical Early Career Fellowship to profile circulating tumour cells (CTCs) and circulating tumour DNA to provide information about a patient's tumour.<br>• Paul Dunn was the recipient of a NHMRC Dora Lush Biomedical Postgraduate Scholarship, with $88 502 for a project entitled *Identifying New Genes and Genetic Factors Causing CADASIL and related Stroke and Vascular Dementia Disorders*.<br>• IHBI also secured three Advance Queensland Industry Research Fellowships for mid-career researchers, with support for Dr Laura Croft (*Towards the clinic: development of a new cancer therapeutic*), Dr Jonathan Ellis (*Developing a comprehensive pharmacogenomics system to prevent adverse drug reactions*) and Dr Neha S Gandhi (*Advanced molecular design of potent chemotherapeutic agents*).<br>• Distinguished Professor Patsy Yates was the first researcher from outside of North America to receive the prestigious Distinguished Researcher award from the international Oncology Nursing Society, recognising research contributions that enhanced the science and practice of oncology nursing.<br>• The Australian Society for Microbiology has awarded Associate Professor Makrina Totsika the Frank Fenner Award, in recognition of her distinguished contributions to microbiology research in Australia.<br>• Associate Professor Dale Nyholt was recognised as a 2018 Highly Cited Researcher in the new cross-field category, placing him among the world's most influential scientists who have demonstrated significant influence through publication of multiple highly cited papers during the past decade.<br>• Associate Professor Jyotsna Batra was named Cure Cancer Australia's Researcher of the Year 2018.<br>• Professor Samantha Keogh and Associate Professor Andrew J Zele were appointed to the 2018 Excellence in Research for Australia (ERA) Research Evaluation Committee for Medical and Health Sciences. ERA is a comprehensive evaluation that examines the entire output of Australian universities' research efforts.<br>• CARP Pharmaceuticals was the focus of a key industry agreement at the 2018 BIO International Convention in Boston in the US, with $4.3 million in funding secured for the continued development of the promising pre-clinical anti-cancer therapeutic candidate DKLS02 with the aim of establishing a clinical trial and recruiting a cohort of patients in late 2019.<br>• Australian Prostate Cancer Research Centre – Queensland (APCRC-Q) received Movember funding in 2018 to recruit up to 180 men for Queensland's contribution to the IRONMAN registry, collecting information from 5000 men in nine countries.<br>• Professor Michael Collins secured funding from Johnson & Johnson Surgical Vision Inc for a research project that involves the assessment of toric intraocular lenses.<br>• Professor Theresa Green was part of a collaborative team that received a Metro North Hospital and Health Service (MNHHS) SEED grant. The collaboration between QUT experts in nursing and computer-human interaction; MNHHS IT and stroke units; and the Stroke Foundation is developing an application to enable a stroke survivor, their family and clinical staff to tailor care.<br>• Federal Minister for Aged Care Ken Wyatt AM launched End of Life Directions for Aged Care (ELDAC) Phase 2, led by project director, IHBI Distinguished Professor Patsy Yates.<br>• Professor Yates also launched the new National Palliative Care Standards and Palliative Care Service Development Guidelines at Parliament House with Palliative Care Australia in February, helping decision-makers and service providers to focus on an important part of the healthcare system.<br>• Professor David Atchison chaired the Committee MS-024 – Spectacles of Standards Australia. The committee was selected to receive the Outstanding Committee Award at the 2018 Standards Australia Awards. |

# Translational Research Institute

**Associate Director IHBI (TRI): Professor Rik Thompson**

| Quick facts and figures | |
|---|---|
| **Number of staff** | 180 members |
| **PhD/Masters research students** | 93 higher degree students enrolled in 2018<br>11 Masters by Research and 28 PhD students graduated in 2018 (including 11 international students) |
| **Research income** | $10 149 832 |
| **Patents** | 5 patents filed in 2018 |
| **Research papers published** | 125 research papers published (as at 21 December 2018) |
| **Key achievements 2018** | • QUT signed an industry agreement in 2018, with an exclusive deal to licence the development of the pre-clinical anti-cancer therapeutic candidate DKLS02 to CARP Pharmaceuticals Pty Ltd. CARP Pharmaceuticals secured $4.3 million in funding for the continued development of DKLS02 with the aim of establishing a clinical trial and recruiting a cohort of patients in late 2019.<br>• The Australian Prostate Cancer Research Centre – Queensland received Movember funding to recruit for IRONMAN, an international population-based prospective registry of 5000 men with advanced prostate cancer.<br>• A state-of-the-art holographic microscope was installed at the Queensland Centre for Drug Target Screening and Characterisation, enabling Chenhall Research Scientist Professor Derek Richard to develop a new generation of therapeutics for cancer and other life-threatening diseases.<br>• Associate Professor Tony Kenna led a successful bid for a National Health and Medical Research Council (NHMRC) Project grant, with $576 807 for a project entitled *Evaluation of a new therapeutic strategy for treatment of systemic sclerosis and systemic lupus erythematosus*.<br>• Dr Arutha Kulasinghe was awarded a NHMRC Peter Doherty Biomedical Early Career Fellowship, with $327 192 for the research project *Precision Medicine in the Immunotherapy Era*.<br>• Dr Kulasinghe also received a TRI Spore Grant, with $80 000 to support his research project *Can a liquid biopsy be used to measure response to immunotherapy in patients with non-small cell lung cancer?*<br>• Successful applicants in the 2018 IHBI TRI Seed Funding Scheme were:<br>— Professor Colleen Nelson (*Mining the Prostate Cancer Transcriptome to Identify and Validate New Immunotherapeutic Targets in Advanced Prostate*)<br>— Professor Selena Bartlett (*Effect of sugar consumption on glioblastoma progression and response to therapy*)<br>— Associate Professor Tony Kenna (*Personalised functional bioassay sensitivity to immunotherapy for bladder cancer*)<br>— Dr Shiv Nagaraj (*Theranostic biomolecules for improved diagnosis and treatment of pancreatic cancer*)<br>• Professor Rik Thompson and Dr Shiv Nagaraj published a critical analysis piece to top-tier journal Nature, entitled *Transition states that allow cancer to spread*.<br>• Associate Professor Elizabeth Williams was part of a collaborative team to be published in *Nature* publication *Nature Communications*, with a manuscript entitled *Hysteresis control of epithelial-mesenchymal transition dynamics conveys a distinct program with enhanced metastatic ability*.<br>• Professor Selena Bartlett and Dr Arnauld Belmer had their manuscript *5-HT1A receptor-dependent modulation of emotional and neurogenic deficits elicited by prolonged consumption of alcohol* accepted for publication in the prestigious Nature publication *Scientific Reports*.<br>• Professor Bartlett also won the competitive pitching competition at Igniter Silicon Valley, pitching her start-up company MiGFiT to 40 prominent investors at the international start up conference.<br>• Professor Derek Richard won the MTPConnect two-minute pitch competition as part of the Bridge Program. He was one of four winners invited to visit Amgen, Merck and Abbvie, with tours of their facilities and meetings with groups leading different aspects of the drug commercialisation process.<br><br>**Note: Data represented in this table may also be detailed within the affiliated theme highlights.* |

# Centre for Children's Health Research

**Associate Director IHBI (CCHR): Professor Stewart Trost**

| Quick facts and figures | |
|---|---|
| **Number of staff** | 75 members |
| **PhD/Masters research students** | 27 higher degree students enrolled in 2018<br>3 Masters by Research and 5 PhD students graduated in 2018 (2 international students) |
| **Research income** | $5 032 614 |
| **Patents** | No patents filed in 2018 |
| **Research papers published** | 117 research papers published |
| **Key achievements 2018** | • Two research groups joined IHBI at CCHR in 2018: The Palliative and Supportive Care Research Group led by Professor Anthony Herbert, Dr Stuart Ekberg and Dr Natalie Bradford; and the Child and Reproductive Health Research Group led by Professor Murray Mitchell.<br>• Associate Professor Leila Cuttle led a successful National Health and Medical Research Council (NHMRC) Project Grant bid, securing $1 224 150 for a project entitled *The use of biomarkers in children to predict healing potential and optimise burn wound care*.<br>• Professor Stewart Trost led a successful NHMRC Project Grant bid, securing $1 169 557 for the project *Short and long-term effects of therapeutic exercise in children with bronchiectasis: a multi-centre randomised controlled trial*.<br>• Dr Rebecca Byrne received $99 645 in funding as part of the Children's Hospital Foundation Woolworths Nutrition-Related Health Services Research Grant round, for a study testing an intervention to build the capacity of child health nurses to support healthy eating in early childhood education and care settings.<br>• The Cough, Airways, and Asthma Research Group, led by Professor Anne Chang, was awarded a Children's Hospital Foundation Translator grant, with $299 996 to conduct a randomised controlled trial on the utility of personalised bronchiectasis management plans for children.<br>• Professor Anne Chang led a collaboration that secured an Medical Research Future Fund/NHMRC Rare Cancers Rare Diseases grant of $2.4 million to conduct research related to improving health outcomes in children and young adults with primary ciliary dyskinesia.<br>• Professor Stewart Trost was part of a collaboration that secured a NHMRC Partnership grant of $406 759 to develop evidence-based physical activity policies for early childhood education and care settings.<br>• Professor Kirstin Spann was elected Australian National Member of the International Committee for the Taxonomy of Viruses.<br>• ABC program *Catalyst* featured Professor Janet Davies in its episode on allergies and hay fever.<br><br>**Note: Data represented in this table may also be detailed within the affiliated theme highlights.* |

# Medical Engineering Research Facility

**Director MERF: Professor Cameron Brown**

| Quick facts and figures | |
|---|---|
| **Number of staff** | 12 members |
| **PhD/Masters research students** | 14 higher degree students enrolled in 2018<br>1 Masters by Research and 4 PhD students graduated in 2018 (4 domestic and 1 international students) |
| **Research income** | $2 364 250 |
| **Patents** | No patents were filed in 2018 |
| **Research papers published** | 58 research papers published based on research conducted at MERF |
| **Key achievements 2018** | • MERF had its 10-year anniversary in 2018. Building on the facility's achievements to date, a new 10-year vision was set to bring cutting-edge physics, medicine and the humanities together to create a better and fairer future for healthcare. The vision outlines four key technology programs that will be central to the future: rockets, robots, light and natural super-materials. It further sets a challenge to develop technological platforms for the ethical development of future medicine and for its ethical delivery.<br>• Supporting the visionary nature of the MERF's goals, a Vision Group was established, comprising well-regarded members from backgrounds including medicine, science, engineering, humanities, politics, diplomacy, communications and clinical administration. They will work closely with MERF researchers to create both scientific and societal change.<br>• MERF hosted 56 Surgical Skills Training Workshops, 2 Queensland Ambulance Service workshops and 20 school engagement visits in 2018.<br>• The QUT Paramedic Management of Medical and Surgical Emergencies undergraduate course was conducted, covering airway management, intubation, managing fractures, CPR and interosseous access, with more than 400 students participating.<br>• MERF invested in a new state-of-the-art C-arm (fluoroscopy device) to expand medical imaging capabilities, as well as four new surgical tables, expanding capabilities and offering competitive advantage in the provision of surgical workshops and preclinical research.<br>• The General Surgical Anatomy Course, accredited by the Royal Australasian College of Surgeons, was offered at MERF for the second time in the third quarter of 2018, with 32 registered participants.<br><br>**Note: Data represented in this table may also be detailed within the affiliated theme highlights.* |

# QIMR Berghofer

**Associate Director IHBI (QIMR Berghofer): Professor Flavia Huygens**

| Quick facts and figures | |
|---|---|
| **Number of staff** | 39 members |
| **PhD/Masters research students** | 14 higher degree students enrolled in 2018<br>2 Masters by Research and 3 PhD student graduated in 2018 (no international students) |
| **Research income** | $2 124 329 |
| **Patents** | 1 patent filed in 2018 |
| **Research papers published** | 24 research papers published |
| **Key achievements 2018** | • Associate Professor Makrina Totsika received the Frank Fenner award from the Australian Society for Microbiology, in recognition of her distinguished contribution to microbiology and, in particular, for advanced research in infectious diseases.<br>• Associate Professor Totsika was awarded a QUT Vice Chancellor's Excellence Award for Research, Partnerships and Engagement.<br>• Associate Professor Totsika was also Elected a Fellow of the Australian Society for Microbiology.<br>• Second-year PhD candidate Randika (Badal Madiththegedara Chamini Randika) was awarded a £5000 research grant from the Royal Society for Tropical Medicine and Hygiene, a prestigious international award with a large number of applications.<br>• Professors Ken Beagley and Flavia Huygens were awarded $195 000 from IHBI's major equipment scheme and SMEP committee for the purchase of a Fortessa X-20 Cell analyser.<br>• PhD candidate Anthony Verderosa was awarded the best oral presentation award at the annual conference IHBI Inspires.<br>• Dr Johanna Kenyon was nominated as the QUT representative for the Academy of Science EMCR Representative Network.<br>• Dr Kenyon was also presented at QUT's Women in Research Showcase.<br>• Otago Innovation Ltd awarded Professor Ken Beagley $71 326 and Immune Solutions Ltd awarded $37 369 for testing a therapeutic HSV vaccine in guinea pigs.<br>• Professor Beagley also featured in the media on the Australian Geographic program in relation to research and development of a chlamydia vaccine for koalas.<br><br>**Note: Data represented in this table may also be detailed within the affiliated theme highlights.* |

# Governance

## 2018 IHBI Executive Committee

The IHBI Executive Committee met four times in 2018 and continued to provide oversight of significant institute activities.

The 2018 IHBI Executive Committee consisted of:

| Professor Arun Sharma | Deputy Vice-Chancellor and Vice-President (Research and Innovation) |
|---|---|
| **Professor Lyn Griffiths** | Executive Director, IHBI |
| **Professor Carol Dickenson** | Provost |
| **Professor Ross Young** | Executive Dean, Faculty of Health |
| **Professor Gordon Wyeth** | Executive Dean, Science and Engineering Faculty |
| **Professor Helen Klaebe** | Pro Vice-Chancellor (Graduate Research and Development) |
| **Mr Graham Fryer** | Vice-President (Resources) and Chief Financial Officer |
| **Professor Greig de Zubicaray** | Associate Dean (Research), Faculty of Health and Deputy Director, IHBI |
| **Ms Elizabeth Kerr** | Institute Manager, IHBI (Secretary) |
| **Ms Carol Richter** | Director, Office of the Deputy Vice-Chancellor (Research and Innovation) (Observer) |

## 2018 IHBI Research Committee

The IHBI Research Committee met monthly from February 2018 and continued to lead facilitation and implementation of IHBI's strategic research development.

The 2018 IHBI Research Committee consisted of:

| Professor Lyn Griffiths | Executive Director, IHBI and Chair |
|---|---|
| **Professor Greig de Zubicaray** | Associate Dean (Research), Faculty of Health and Deputy Director, IHBI |
| **Professor Monika Janda**<br>**Professor Neil King** | Theme Leader, Health Determinants and Health Systems, IHBI |
| **Associate Professor Travis Klein** | Theme Leader, Injury Prevention and Trauma Management, IHBI |
| **Professor Nathan Subramaniam** | Theme Leader, Chronic Disease and Ageing, IHBI |
| **Ms Elizabeth Kerr** | Institute Manager, IHBI |
| **Associate Professor Renata Meuter** | Head of School, Psychology and Counselling, Faculty of Health |
| **Professor Hilary Bambrick** | Head of School, Public Health and Social Work, Faculty of Health |
| **Professor Remco Polman** | Head of School, Exercise and Nutrition Sciences, Faculty of Health |
| **Professor Patsy Yates** | Head of School, Nursing, Faculty of Health |

| 2018 IHBI Research Committee (continued) | |
|---|---|
| **Associate Professor Terry Walsh**<br>**Professor David Waugh** | Head of School, Biomedical Sciences, Faculty of Health |
| **Professor Louise Hafner** | Head of School, Biomedical Sciences, Faculty of Health (Acting) |
| **Associate Professor Peter Hendicott**<br>**Professor Sharon Bentley** | Head of School, Optometry and Vision Science, Faculty of Health |
| **Professor Lisa Nissen** | Head of School, Clinical Sciences, Faculty of Health |
| **Professor Neil King** | Director, Research Training, Faculty of Health |
| **Professor Helen Edwards** | Associate Dean International and Engagement, Faculty of Health |
| **Professor John Bell** | Head of School, Chemistry, Physics and Mechanical Engineering, Science and Engineering Faculty |
| **Professor Troy Farrell** | Head of School, Mathematical Sciences, Science and Engineering Faculty |
| **Professor David Lovell** | Head of School, Electrical Engineering and Computer Science, Science and Engineering Faculty |
| **Professor Andrew Bradley** | Associate Dean (Research), Science and Engineering Faculty |
| **Ms Tina Huddart**<br>**Ms Helen Weir** | Faculty Manager, Faculty of Health<br>Director of Faculty Services, Faculty of Health |
| **Ms Elizabeth Wickham** | Faculty Manager, Science and Engineering Faculty |
| **Professor Rik Thompson** | Associate Director IHBI (TRI) |
| **Professor Stuart Trost** | Associate Director IHBI (CCHR) |
| **Professor Flavia Huygens** | Associate Director IHBI (QIMR Berghofer) |
| **Professor Cameron Brown** | Director MERF, IHBI |
| **Dr Elena Juan Pardo** | IHBI Research Centres Representative |
| **Ms Tanya Edwards** | Minute Secretary |

## 2018 IHBI senior directorate staff

A team of professional and academic staff ably supports IHBI researchers. The IHBI Directorate is responsible for the development, implementation and provision of administrative, financial, development, operational, research and information technology services to the institute's researchers, students and professional staff.

The IHBI Directorate team leaders included:

| Ms Elizabeth Kerr | Institute Manager |
|---|---|
| **Dr Dimitrios Vagenas** | Research Methods Group Leader |
| **Ms Christine Lane** | Business Manager |
| **Ms Sharyn Tidswell** | Philanthropy Officer |
| **Mr Michael O'Brien** | Finance Manager |
| **Ms Lorrelle Allen**<br>**Dr Christina Theodoropoulos** | Laboratory and Building Services Manager |
| **Mr Darren D'Souza** | Information Technology Manager |
| **Dr Emily Alvino** | Research and Administration Services Manager |
| **Mr Erik de Wit** | Communications Program Coordinator |

# Collaboration

**In 2018, IHBI hosted 107 conferences, events, seminars, forums, research methods workshops, professional education events and tours. IHBI researchers received 2740 visitors during the year to learn about the institute's research and work on collaborative projects, grant applications and publications. They include:**

## Asia

- Dr Abbas Movahednia, Founder, Tasnim Pharmaceuticals, Iran (April 30)
- Dr Mohammad-Mehdi Movahednia, Tasnim Pharmaceuticals, Iran (April 30)
- Associative Professor Nina Wu, Department of Social Medicine and Health Management, China Capital Medical University (November 2)

## The Americas

- Dr Xiaoping Ning, Research & Development Clinical Leader, EU, Japan and growth markets, TEVA Pharmaceuticals, US (March 20)
- Associate Professor Katherine Burdick, Associate Vice Chair for Research, Brigham and Women's Hospital; Associate Professor of Psychology in Psychiatry, Harvard Medical School, US (November 6)
- Professor Ian Graham, Senior Scientist, Centre for Practice-Changing Research, Ottawa Hospital Research Institute, Canada (December 4)
- Dr Camille Nebeker, Assistant Professor of Behavioural Medicine, Department of Family Medicine & Public Health, School of Medicine, UC San Diego, US (December 6)

## Europe

- Professor Fliss Murtagh, Associate Director, Wolfson Palliative Care Research Centre, Hull York Medical School, UK (February 1)
- Professor David Franklin, Associate Professor of Neuromuscular Diagnostics, Technische Universität München, Germany (March 21)
- Professor Trish Greenhalgh, Professor of Primary Care Health Sciences and Fellow of Green Templeton College, University of Oxford, UK (March 28)
- Professor Jeremy Turnbull, Head, Molecular Glycobiology Research, University of Liverpool, UK (April 9)
- Professor Felipe Prosper, the University of Navarra, Spain (May 14)
- Professor Ravinder Dahiya, The University of Glasgow, Scotland (May 24)
- Professor Alex Wade, Co-Director, York Neuroimaging Centre, Department of Psychology, the University of York, UK (July 12)
- Professor Philip Clarke, Director, Health Economics Research Centre, the University of Oxford, UK (August 3)
- Professor Luc Deliens, Ghent University/Vrije Universiteit, Belgium (September 12)
- Professor Oliver Friedrich, Institute of Medical Biotechnology, Friedrich-Alexander-Universität, Erlangen-Nürnberg, Germany (September 14)
- Professor Paul Dalton, University of Würzburg, Germany (September 25)
- Dr Gert Scheper, Leader, Compound Development Team, HPV Vaccine Program, Janssen Vaccines & Prevention, The Netherlands (October 10)
- Dr Magda Ulrich, group leader, preclinical research, Association of Dutch Burn Centres, The Netherlands (November 2)
- Dr Roman Kislov, Senior Research Fellow, The University of Manchester, UK (November 20)

- Professor Catherine Liegeois-Chauvel, Director, Research Emeritus, INSERM-Aix Marseille University, France (November 23)
- Dr Vitória Piai, Donders Institute for Brain, Cognition and Behaviour, Radboud University, Radboud University Medical Center, Nijmegen, The Netherlands (November 23)

## Africa

- Professor Bala Pillay, Acting Deputy Vice-Chancellor of Teaching and Learning, University of KwaZulu-Natal, South Africa (December 12)
- Dr Manormoney Pillay, Senior Lecturer, School of Laboratory Medicine and Medical Sciences, College of Health Sciences, University of KwaZulu-Natal, South Africa (December 12)

## Australia and New Zealand

- Anthony Vadalma, Wenross Holdings, Queensland (February 14)
- Dr Haitham Tuffaha, NHMRC Early Career Fellow, Senior Research Fellow in Health Economics, Centre for Applied Health Economics, Griffith University (March 13)
- The Hon Trevor Evans MP, Federal Member for Brisbane (March 14)
- Victor Loh, Country Medical Director, TEVA Pharmaceuticals, Australia (March 20)
- Diana Lau, Medical Manager, Oncology & Migraine, TEVA Pharmaceuticals Australia (March 20)
- The Hon Karen Andrews MP, Minister for Industry, Science and Technology (April 19)
- Dr Christine Williams, Queensland Chief Scientist (Acting) (April 19)
- Professor Gordon Wallace, Director, Intelligent Polymer Research Institute, University of Wollongong (April 19)
- Professor Peter Choong, Sir Hugh Devine Professor and Chair of Surgery, St Vincent's Hospital, Melbourne (April 19)
- Dr Michael Wagels, Staff Specialist Plastic and Reconstructive Surgeon, Princess Alexandra Hospital (April 19)
- Dr Tom Snelling, Head, Infectious Disease Implementation; Director, Wesfarmers Centre of Vaccines & Infectious Diseases, Perth (July 21)
- Dr Mick Adams, Australian Indigenous HealthInfoNet, Edith Cowan University (August 22)
- Charles Davison, NSW Ministry of Health (August 22)
- Gail Garvey, Deputy Division Leader, Wellbeing and Preventable Chronic Diseases, Menzies School of Health Research (August 22)
- Warren Locke, Workforce Strategy, Department of Health, Queensland (August 22)
- Donna Murray, Chief Executive Officer, Indigenous Allied Health Australia (August 22)
- Hayley McQuire, Training Development Officer, Indigenous Allied Health Australia (August 22)
- Karl Briscoe, Chief Executive Officer, National Aboriginal and Torres Strait Islander Health Workers Association (August 22)
- Colleen Gibbs, Membership and Stakeholder Engagement Manager, Congress of Aboriginal and Torres Strait Islander Nurses and Midwives (August 22)
- Liz Callaghan, Chief Executive Officer, Palliative Care Australia (August 22)
- Wayne Christian, Mookai Rosie Bi Bayan (August 22)

## International delegations visiting IHBI

- Delegation from Kagawa Nutrition University, Japan (February 15)
- A trade delegation visiting as part of the Commonwealth Games, including representatives from investment firms and Trade Investment Queensland (April 13)
- Delegation from Loughborough University, UK, including Vice-Chancellor and President, Pro-Vice Chancellor (Enterprise), Pro-Vice Chancellor (Teaching), Special Projects Officer (May 3)
- Delegation from Hubei University of Technology, China (June 28)
- Delegation from the National Taipei University of Science and Health (July 31)
- Delegation from Nanjing Medical University, China (August 7)
- Delegation from Jiangsu Vocational College of Medicine, China (August 21)
- Delegation from Southern Medical University, China (August 28)
- Delegation visiting as part of the World Hospital Congress 2018, including representatives from Queensland Health, West China School of Medicine/West China Hospital of Sichuan University, Bupa, Asia Pacific Medical Ltd, Beijing Chao-Yang Hospital, Capital Medical University, The First Hospital of Nanchang, Deloitte Consulting, Australian Healthcare and Hospitals Association, Peking University Cancer Hospital, Wujin People's Hospital (October 10)
- Delegation from AWEX, the trade and investment agency for the Wallonia region, Belgium (October 29)

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