The University Of Queensland AUSTRALIA | IMB
Institute for Molecular Bioscience

YEAR IN REVIEW

Institute for Molecular Bioscience

Connecting with industry leaders

Welcome to The University of Queensland Institute for Molecular Bioscience

2017 Year in Review

About IMB

The University of Queensland Institute for Molecular Bioscience (IMB) is Asia-Pacific's leading life sciences research institute, committed to improving the health of humanity through research and translation.

IMB is driving discovery and impact through the development of preventions, diagnostics and solutions to address some of the world's greatest health and environmental challenges, including chronic pain, superbugs, cancer, cardiovascular disease, inflammation and sustainable solutions.

With an annual budget of $60 million, IMB is home to 500 researchers, students and support staff from more than 40 countries.

The Institute's research outcomes are protected and commercialised by the University-owned technology transfer group UniQuest.

Research

- Centre for Inflammation and Disease Research
- Centre for Superbug Solutions
- Centre for Pain Research
- Centre for Solar Biotechnology
- UQ Centre for Cardiac and Vascular Biology
- UQ Project Three Billion

Strategic priorities

- Discovery excellence
- Translational impacts
- Learning
- Leadership and engagement
- Equity and sustainability

The impact of our research spans the areas of

Cancer

Infection

Superbugs

Brain injury & disease

Pain

Complex diseases

Inflammation

Heart & cardiovascular diseases

Solar biotechnology

Agriculture

Diabetes & obesity

Share in our discoveries

Subscribe to our IMB news and event updates
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● **Featured** IMB researchers are studying zebrafish and their embryos to learn about human heart development and cardiovascular diseases

2017 Snapshot

Five hundred
researchers, postgraduate students and support staff

- **126** Active higher degree by research students
- **21** Higher degree by research students graduated
- **99** Honours, undergraduate, visiting students and coursework masters students hosted at IMB

32
countries represented
In IMB's student cohort

$17 million income
from the National Health and Medical Research Council

Total research income

- **$33M** Competitive funding
- **$21M** Operating
- **$3M** Philanthropy, commercialisation, other income and recoveries

6
Research centres

9
World-class research
support facilities

$8.4 million income
from the Australian Research Council

Host
to the Queensland Emory Drug Discovery Initiative (QEDDI)

330
Scientific publications

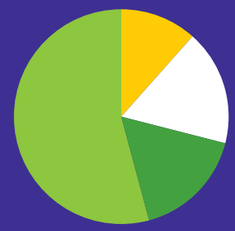
48
High-impact
scientific publications (impact factor >10)

4
Highly Cited
Researchers

6
Fellows
of the Australian Academy of Science

5
New patents filed

35
Patent families managed



Patent families managed

- **4** Agricultural/industrial biotechnology
- **6** Diagnostic/devices
- **6** Drug discovery tools
- **19** Therapeutics

IMB spinout Protagonist
entered into a $1B worldwide agreement
to co-develop drug for inflammatory bowel disease

59%
of IMB publications
have an international collaborator

6
Active Australian Research Council Linkage Projects
with industry partners

571

Collaborations in 58 countries

Message from the Vice-Chancellor and President

Professor Peter Høj

While reflecting upon the influential research of the Institute for Molecular Bioscience (IMB), it is striking how critical successful partnerships are in today's diverse and multi-disciplinary research environment. The world is changing at an ever-growing pace, and institutions that draw upon the expertise of partners to make and amplify discoveries are best-placed to make a positive impact on their local and global communities.

Impact can take time to become apparent, but when it does the benefits can truly change the world. Sixteen years after it was first established as a spin-out company from IMB research, Protagonist Therapeutics entered into a $1 billion agreement with Janssen Biotech in 2017 to co-develop a drug candidate for inflammatory bowel disease. We have great belief that a new collaboration between IMB researchers and Zealand Pharma in Denmark will develop new medicines from venom research discoveries to treat gastrointestinal diseases.

The University of Queensland is a comprehensive research institution and IMB is an important driver of significant collaborations across UQ faculties and institutes. For example, IMB researchers are pivotal contributors to the new UQ Centre for Cardiac and Vascular Biology (CCVB). CCVB delivers a novel multi-disciplinary research approach for cardiovascular disease – a disease which kills an average of one Australian every 12 minutes. The Centre for Solar Biotechnology, led by IMB researchers, connects expertise from across UQ with international research teams and industry, to accelerate technologies that fuel the future and transform societies.

IMB attracts world-leading researchers with expertise valued highly by collaborators around the globe and who contribute to UQ's vision of knowledge leadership for a better world. In 2017, IMB researchers joined with international colleagues on projects advancing our knowledge in postpartum depression, childhood kidney disease, brain tumours, superbugs, and a worldwide collaboration to map the genetic fingerprint of every cell in the human body. Its research students come from more than 40 countries, an indicator of the quality of research and the rich mix of cultures and minds that fuel research engagement and impact at the IMB.

The continued success of IMB in awards, publications, industry support and competitive funding programs in 2017 reaffirms the quality of its research and elevates UQ's standing on the world stage. Professor Jian Yang received one of the Prime Minister's Prizes for Science in recognition of his paradigm-shifting contributions to the study of human genetics through developing new methods for identifying the genetic factors underlying complex diseases. This work creates a foundation that will drive discovery and impact across a range of diseases and improve our prospects of a healthily ageing population.

Through the study of the very building blocks of life, IMB is uniquely positioned to effect positive change – in health and medicine, sustainable technologies, agriculture and the environment. I commend IMB Director Professor Brandon Wainwright and his team for another highly successful year. I extend the University's appreciation to all who work and study at IMB, and to the Institute's collaborators and supporters.

Featured **Professor Peter Høj**

Message from the Director

Professor Brandon Wainwright

At IMB, we are inspired to find ways to prevent, diagnose and treat disease, and sustainably feed and fuel the world. Our unique combination of researchers, access to world-leading technologies and placement in a leading research University allows us to work with our partners to find the solutions they need to make a difference.

We work with our partners to embed research discovery into the problem-solving process. Our ethos is that together, we can make discoveries faster, more effectively and bring solutions to market more quickly and with greater impact.

We celebrated our partnerships at our Research Engagement Dinner, held in early November, where we brought together industry, clinicians and advocacy groups with our researchers to foster an ecosystem of integrated problem-solving, discovery and translation.

Research requires commitment, bravery and a passion to travel to the edge, to find what no-one else has yet discovered and to pursue truth and knowledge to its very core. Thanks in part to the support and commitment of our partners, some of our 2017 breakthroughs include:

- we discovered we could shrink brain tumours using existing breast cancer treatments
- we helped an Australian family-owned company create the first mass-producible organic insecticide from peptides found in the Butterfly Pea plant
- we discovered a small protein in spider venom that could prevent the devastating brain damage caused by stroke
- we were part of a successful push to put endometriosis on the national agenda to improve understanding, treatment and support of this debilitating disease
- we identified genetic factors contributing to the risk of developing diseases like motor neurone disease and endometriosis, advancing our understanding of these disorders on a global scale.

Training the future leaders is close to our hearts and integral to our mission as a University Institute. It is important to us that we ensure our future leaders are employable, career-wise and career-ready in academia, industry, government and beyond. In 2017, we launched the IMB Industry Mentorship Program for our research training students and early career researchers to link them with policy makers, industry and entrepreneurs. We have humbly benefitted from this by creating new relationships with people who are passionate about the changes that can be brought to the broader community by discovery research.

The quality of our impact is only as good as the quality of our researchers and the enabling services of the professional staff supporting them. I feel both proud and privileged to lead a remarkable team who is so committed to improving quality of life through discovery research.

IMB is a place of passion, discovery and excellence, driven to understanding and solving the problems of today to create lasting global change. If you share this passion, please join us at the edge.

Right Professor Brandon Wainwright

IMB is a place of passion, discovery and excellence, driven to understanding and solving the problems of today to create lasting global change.

Highlights from 2017

Research highlights

Shrinking childhood brain tumours

A drug used to treat breast cancer has been found to effectively shrink medulloblastoma, the most common malignant brain tumour found in children. The discovery was made by an international team of researchers steered by IMB's Professor Brandon Wainwright, and has led to a clinical trial using the drug palbociclib to treat children with medulloblastoma. Brain tumours are the most common cause of cancer death in infants, children and adolescents – with survivors at risk of suffering significant long-term side effects from existing treatments. Researchers hope to reduce the devastation for families caused by medulloblastoma.

$1B agreement with global pharmaceutical company

IMB spin-out company Protagonist Therapeutics Inc. entered into an agreement with Janssen to co-develop and commercialise an oral peptide drug candidate for inflammatory bowel disease. The biopharmaceutical company, founded by IMB researcher Associate Professor Mark Smythe, is developing oral drugs to treat gastrointestinal disorders such as inflammatory bowel disease.

The bold plan to map every cell in your body

IMB researchers have joined forces with scientists from 14 of Australia's biomedical centres as part of a global initiative to map every single cell in the human body to create an 'instruction manual' for life itself. The ambitious project is called the Human Cell Atlas and aims to create comprehensive maps each of our cells. Data will be available to scientists around the world and could have a significant impact on how we understand, diagnose, monitor and treat disease.

Understanding motor neurone disease

Professor Naomi Wray led an international research team who identified genetic factors contributing to the risk of developing motor neurone disease (MND) – a progressive, terminal disease in which the motor neurons in the brain and spinal cord that control muscles progressively die. Identifying new risk genes helps build a more complete picture of the causes of MND and provides new avenues for research into potential treatments for this rapidly progressing degenerative disease.

The Cane Toad Challenge

Since their introduction to Australia over 80 years ago, the cane toad has had a devastating ecological impact on native wildlife and the environment. Professor Rob Capon is responsible for the invention of cane toad tadpole trapping technology that uses a natural toad pheromone to lure toad tadpoles into a trap. Professor Capon has partnered with councils and community groups across Australia to fight back against the scourge of cane toads using his innovative tadpole baits.

Spider venom to prevent brain damage from stroke

IMB researcher Professor Glenn King led a research team who discovered a small protein in spider venom that could prevent the devastating brain damage caused by stroke. The protein, Hi1a, blocks acid-sensing ion channels in the brain, which are key drivers of brain damage after stroke. During preclinical studies researchers found a single dose of Hi1a administered up to eight hours after stroke protected brain tissue and drastically improved neurological performance.

Teaming up to create a world-first organic insecticide

IMB's Craik group partnered with an Australian family-owned company, Innovate Ag, to help create Sero-X, the world's first mass-producible organic insecticide. The insecticide uses peptides known as cyclotides – which repel insects and are found in the Butterfly Pea plant. Professor David Craik has been working with Innovate Ag to determine how to extract active cyclotides, optimise their yield and determine their safety.

A **Professor Rob Capon** (left) leads IMB's Cane Toad Challenge

B **Professor David Craik** and his lab helped create an organic insecticide. *Photo: Studio Sixty and UQ Advancement*

C Childhood brain tumour researchers (L to R) **Dr Laura Genovesi** and **Dr Christelle Adolphe**

D **Professor Naomi Wray**, motor neurone disease researcher

E Spider venom milking

Grants & fellowships

Funding to promote partnerships — for discovery, invention and application

Innovative ideas driven by IMB researchers were rewarded in 2017, as many individuals and teams were awarded competitive research grants and fellowships from the National Health and Medical Research Council (NHMRC) and Australian Research Council (ARC).

Funding will help lead to discoveries that break through knowledge gaps and develop the skills of the next generation.

Funding commenced for the following IMB-led ARC and NHMRC grants in 2017

- 1 NHMRC Program grant totalling **$6,904,815**
- 7 NHMRC Project grants totalling **$5,063,593**
- 2 NHMRC Development grants totalling **$1,237,685**
- 4 ARC Discovery Project grants totalling **$1,694,500**
- 2 ARC Linkage Infrastructure, Equipment and Facilities (LIEF) grant **$1,000,000**

For a full list of grants which commenced in 2017 please see page 58.

Fellowships commenced in 2017

- 1 ARC Discovery Early Career Researcher Award (DECRA) totalling **$372,000**
- 2 NHMRC Research Fellow totalling **$1,627,755**
- 2 NHMRC Career Development Fellows totalling **$940,288**
- 3 NHMRC Early Career Fellows totalling **$1,046,304**
- 1 CSIRO Future Science Fellow in Synthetic Biology totalling **$211,398**

Total competitive fellowships continuing in 2017

- 1 ARC Australian Laureate Fellow
- 3 ARC Future Fellows
- 2 ARC Discovery Early Career Researcher Awards (DECRA)
- 14 NHMRC Research Fellows
- 5 NHMRC Career Development Fellows
- 1 NHMRC/Heart Foundation Career Development Fellow
- 1 The Viertel Charitable Foundation Senior Medical Research Fellowship
- 1 NHMRC-ARC Dementia Research Development Fellow
- 3 NHMRC Early Career Fellows
- 1 John Stocker Postdoctoral Fellow

Featured Researchers from IMB and La Trobe University are working together to grow drugs in plants like native tobacco

57.6%

of IMB's 2017 income came from competitive funding

2017 Sources of Competitive Funding

- ANZ Trustees
- Australian Cancer Research Foundation
- Australian Research Council
- Autism CRC Limited
- Cancer Council Queensland
- CSIRO
- CURE (Citizens United for Research in Epilepsy) (US)
- Ferring Research Institute
- Heart Foundation
- Human Frontier Science Program (France)
- Horizon 2020
- International Association for the Study of Pain
- Motor Neuron Disease Research Institute of Australia Inc
- National Health and Medical Research Council
- National Institutes of Health (US)
- Queensland Government
- Science and Industry Endowment Fund
- Shake It Up Australia Foundation
- The Cass Foundation
- The Kids' Cancer Project
- The Michael J Fox Foundation
- The Ramaciotti Foundations
- The Viertel Charitable Foundation
- Wellcome Trust (UK)
- Westpac Bicentennial Foundation

Award highlights

Work to decode the human genome awarded two great honours

Professor Jian Yang was awarded the Frank Fenner Prize for Life Scientist of the Year at the Prime Minister's Prizes for Science held at Parliament House, as well as the Senior Researcher Award for Queensland at the Australian Society for Medical Research gala dinner.

Both prestigious awards recognise the epic contributions Professor Yang has made to the study of human genetics, through developing new statistical methods for identifying the genetic factors underlying complex diseases.

His work will help to better understand the basis of disease, allowing for the design of new drugs and improved prediction of who is at risk of diseases such as obesity, schizophrenia and cognitive ability.

A Professor Jian Yang

Immune detective wins national medical research award

Being the top-ranked researcher awarded an early-career NHMRC fellowship in 2016 has earned Dr Larisa Labzin the National Health and Medical Research Council (NHMRC) Frank Fenner Award.

Dr Labzin is working to understand how our body fights back against viruses. In particular, she is investigating the role of a specific protein, TRIM21, in detecting and fighting disease within cells of the immune system.

She hopes her work will lead to improved treatments for common viruses such as respiratory tract infections and some autoimmune diseases like lupus.

Dr Labzin's award marks the sixth time an IMB researcher has won a Research Excellence Award for being the top-ranked applicant in the nation for an NHMRC funding scheme.

B Dr Larisa Labzin

Childhood brain cancer researcher awarded for impact

Dr Laura Genovesi was awarded a 2017 Early Career Fellowship from Cure Brain Cancer Foundation to progress research into medulloblastoma, the most common type of malignant childhood brain cancer. Dr Genovesi will receive $115,00 per year over the next three years to further build on her research into identifying new treatments for medulloblastoma.

Dr Genovesi previously examined the genetic code of medulloblastoma to predict whether tumours responded to already-approved drugs. Consequently, Dr Genovesi and her colleagues tested and found an existing breast cancer treatment caused rapid brain tumour regression.

C Dr Laura Genovesi

Top researcher awarded in a heartbeat

Dr Nathan Palpant received a UQ Foundation Research Excellence Award in recognition of the enormous contributions he has made to an international effort to fight cardiovascular disease, the leading cause of death around the world.

His work will help researchers understand the basis of heart development and disease. Dr Palpant uses stem cells to make heart muscle and vascular cells which are vital for disease modelling and developing new drugs for tissue regeneration.

Dr Palpant was also awarded a Heart Foundation Future Leader Fellowship to identify new drugs to improve the viability of donor organs and increase the rate of successful heart transplants. He is partnering with Dr John Fraser from The Prince Charles Hospital on translating this research to a clinical setting.

D Dr Nathan Palpant

Partnering for discovery, solutions and change

Pledge for action against endometriosis delivers hope for Australian women

Hundreds of thousands of women around Australia have been suffering in silence with a debilitating disease called endometriosis. With no lasting treatments and no cure, they're enduring symptoms like chronic pelvic pain and infertility. The Australian Coalition for Endometriosis (ACE) vowed to put a stop to it – and now these women have hope.

Australian Health Minister Greg Hunt has revealed the development of a national plan to improve the treatment, understanding, and awareness of endometriosis.

A targeted call for endometriosis research has been issued with $2.5 million in funding to be provided from the Medical Research Future Fund. Funding of $160,000 has also been awarded to IMB Professor Grant Montgomery to continue his work using genomics to investigate the causes of endometriosis, and to find better treatments.

The research: Unravelling the causes of endometriosis

Professor Montgomery co-led the world's largest study into the genetic causes of endometriosis, which helped identify five new gene regions linked to the disease. Professor Montgomery said the findings were a step towards identifying the currently unknown causes of endometriosis.

"We know genetic factors account for 50 per cent of a woman's risk of developing endometriosis; however, it is not one gene mutation that causes this disease, but multiple genetic variants that contribute incrementally to increasing a person's risk," he said.

"Identifying the genomic regions is a critical first step, but in each of those regions, many genes could contribute to causing the disease.

"The causes of this devastating condition are poorly understood, and it has been a difficult disease to study. However, we have made excellent progress in the last five years and now is the time to capitalise on this success.

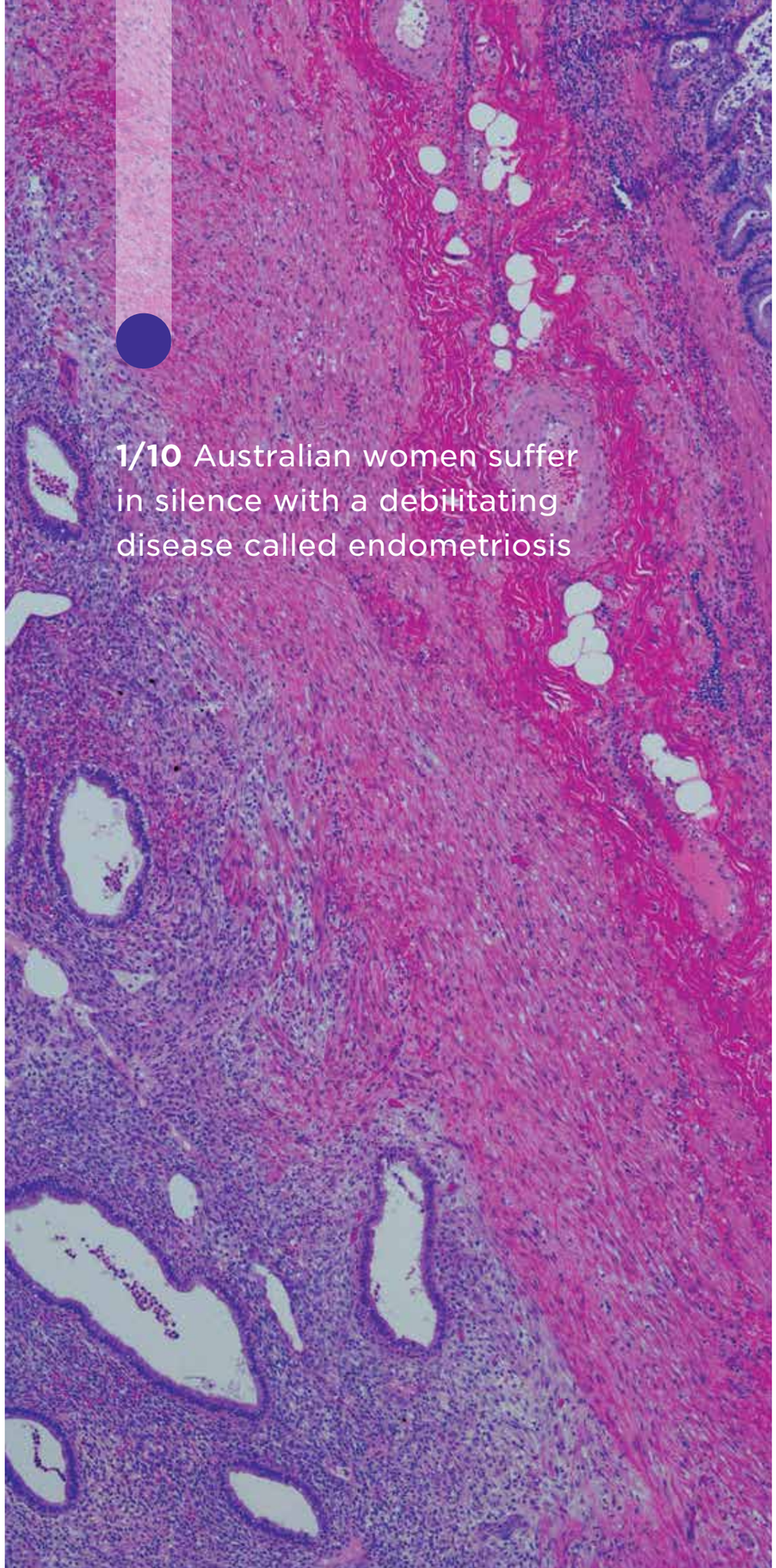
"The combination of advances in genomics, large international genetic studies, better model systems, and ability to analyse large datasets of patient information all provide the catalyst needed to accelerate research progress into endometriosis, if backed by appropriate funding."

The Australian Coalition for Endometriosis (ACE)

Professor Montgomery has been supporting ACE and the pledge of additional research funding. His efforts have stretched from the lab bench right through to Australian federal parliament.

"ACE is a coalition of patients and advocacy groups working closely with researchers and clinicians. Together we have been fighting to put research funding for endometriosis on the Australian government agenda," says Professor Montgomery.

They succeeded. Greater awareness of endometriosis and the pledge for more research funding will ultimately lead to better treatments for the one in 10 women living with this debilitating disease.



● **Featured** Micrograph of endometriosis of the appendix

Unravelling the secrets of the immune system to tackle the world's most challenging inflammatory diseases

Common tips for staying healthy and ageing well, such as keeping active in mind and body and choosing healthy foods, all help us live a long and disease-free life, but sometimes these lifestyle changes are just not enough.

There are many inflammation-related diseases that often come with growing older. Neurodegenerative diseases such as Parkinson's and Alzheimer's, type 2 diabetes, heart and liver disease, rheumatoid arthritis, gout and even some cancers are all driven by prolonged or dysregulated inflammatory response.

In fact, uncontrolled inflammation has been linked to a myriad of debilitating and devastating diseases – it's no wonder unravelling the secrets of the immune system has become an urgent research priority.

By defining the molecular processes behind inflammation, researchers at IMB are laying the groundwork for new therapies to fight not just one disease, but many.

The Inflammasome lab focuses on machine-like protein complexes called inflammasomes that form when the immune system detects an infection, injury or other disturbance. Once assembled, inflammasomes send messages to immune cells, instructing them to respond.

Associate Professor Kate Schroder said during injury or infection, the immune response protects the body by launching inflammation to promote healing or to eliminate agents that may cause harm.

It is when the disturbance cannot be cleared that inflammasomes damage healthy tissues, and this cycle of inflammation becomes the driver of disease.

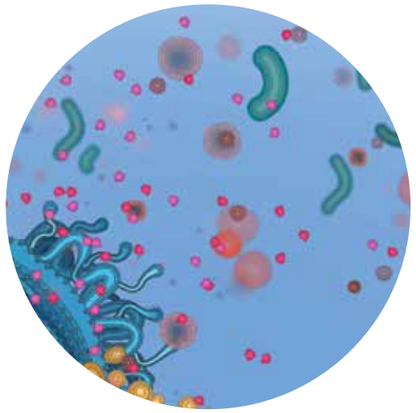
"In the case of Alzheimer's, the immune system detects the presence of amyloid plaques, and fires off an inflammatory response. But the immune cells can't remove the plaques so the inflammasomes continue to fire, and the sustained inflammation drives neurodegenerative damage," Dr Schroder said.

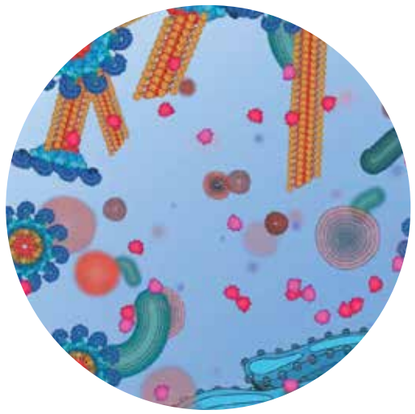
Discovering how to switch off uncontrolled inflammation could be a silver bullet for a range of diseases driven by the uncontrolled firing of inflammasomes. But first researchers need a thorough understanding of how the system works when an otherwise healthy person has an infection or injury.

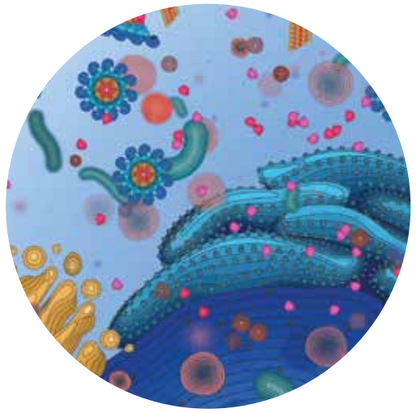
Dr Schroder's team has made important inroads into explaining these processes, including how the inflammasomes would usually turn themselves off.

"The inflammasome initiates the inflammation process by activating a protein that functions like a pair of scissors, and cuts itself and other proteins. We recently discovered that after a period of time this protein cuts itself a second time to turn off the pathway," she said.

"This acts like an in-built timer switch, ensuring the inflammasomes only fire for a specific length of time after they are triggered. If we can find a way to tweak this system we could turn it off manually in disease to stop the damage caused by sustained inflammation."







The team's research could improve the lives of those suffering some of the world's most challenging inflammatory diseases.

IMB has been working with industry partners to develop new drug candidates to help those affected by inflammatory diseases.

Compounds to block inflammasome have been developed by IMB researchers including Associate Professor Schroder and Professor Matt Cooper, and are being commercialised by Inflazome Ltd, a start-up drug development company founded on research from the IMB Centre for Inflammation and Disease Research and Trinity College Dublin.

This partnership ensures this research into the causes of inflammation has the best chance of benefiting those who need it most – patients worldwide who are suffering the effects of debilitating inflammatory diseases.

● **Featured** Illustration of the inflammasome, a cell signalling pathway that generates inflammation

The fight to protect children from an overlooked killer disease

It often begins silently. Unsuspecting parents think their child has the flu, pneumonia or even a urinary tract infection. But before long, their child's health deteriorates, as widespread inflammation and infection ravage through the body. If not treated promptly, this 'silent killer' can lead to multiple organ failure and even death.

Sepsis, also known as 'blood poisoning', is a life-threatening condition that arises when the body overreacts to an infection - injuring its own organs and tissues in the process.

Over 18,000 Australians suffer from sepsis every year. From those affected, about 5000 die and half the survivors are left with a disability or impaired function. Although it can affect anyone, children and infants are at greatest risk of suffering from sepsis, resulting in a disproportionate representation from this group.

Symptoms of sepsis can be difficult to identify as they often mimic the flu and can include high temperatures, rapid breathing and lethargy.

Researchers at IMB have partnered with Lady Cilento Children's Hospital to develop diagnostic tools to rapidly identify sepsis and treat patients before it escalates.

Developing a portable device for rapid detection of infection

IMB's Associate Professor Lachlan Coin and his team use genomics tools to uncover biomarkers to rapidly characterise pathogenic bacterial infections.

"Identifying that a patient has a pathogenic bacterial infection, correctly characterising the type of bacterial infection, and rapidly identifying the presence of antibiotic-resistant genes, are imperative to prescribing the correct antibiotic," Associate Professor Coin said.

30m

people worldwide are affected with sepsis each year

"The current testing process is long, up to 48 hours, and often returns an inconclusive result. Patients are therefore often given a broad-spectrum antibiotic which can be 'hit-and-miss' and contribute to bacteria developing resistance.

"We are developing an approach which allows clinicians to identify the presence of a bacterial rather than a viral infection; the bacterial species and the presence of antibiotic-resistance genes within six hours, or a single hospital shift."

The technology utilises nanoparticles which can bind to and extract bacteria from a biological fluid, such as blood.

"By concentrating bacterial cells, we can extract and sequence bacterial DNA, using a portable sequencing device the size of a mobile phone," Associate Professor Coin said.

"This will be life-saving for many patients who fly under-the-radar with sepsis, as every hour of delay in diagnosis increases a patient's risk of death by four per cent."

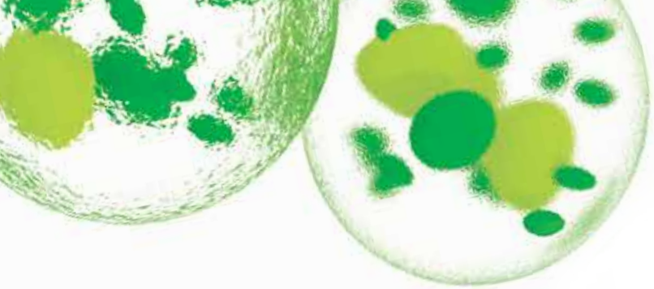
From bench to bedside – combining expertise to achieve rapid clinical outcomes

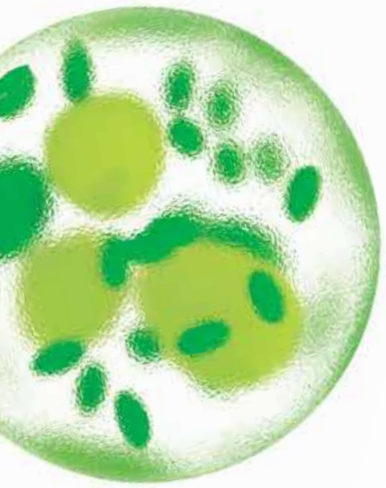
Associate Professor Luregn Schlapbach, a paediatric intensivist at Lady Cilento Children's Hospital and clinical partner of IMB, said the development of point-of-care diagnostic tests is considered crucial to prevent deaths in children from sepsis.

"We have a lot of good treatments, however they are often used too late or inaccurately. We have to find better markers that tell us what drugs a child needs," he said.

"Being a clinical researcher, I rely on good collaborations with lab researchers. IMB has a unique group with expertise around analysing our genes and the way genes are activated. This approach has the potential to identify much faster which patients have sepsis.

"Such collaborations are essential to achieve rapid outcomes of research that will lead to clinical change."

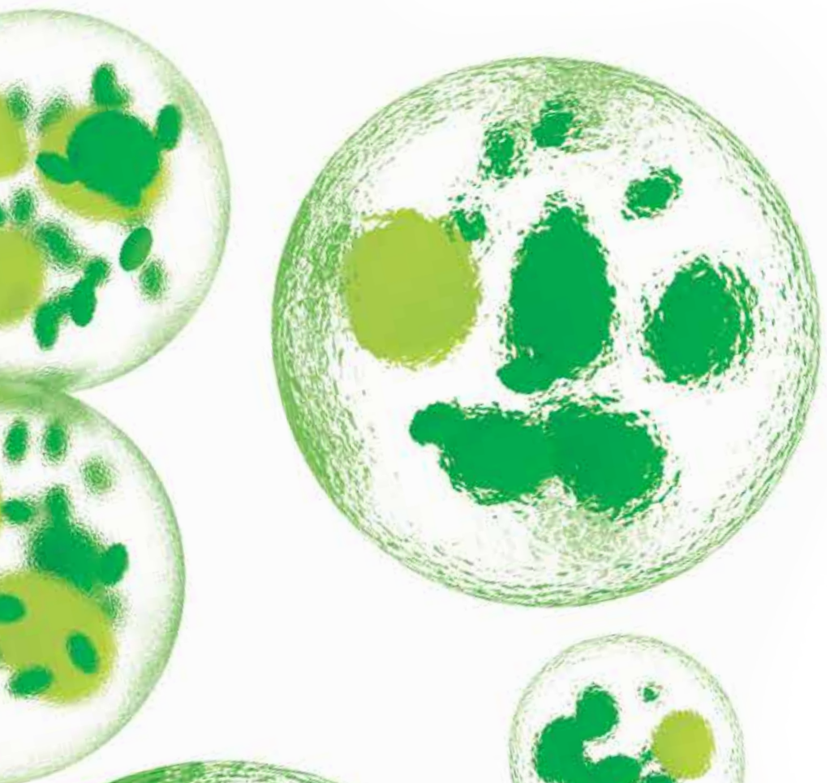




Could algae get the green light to grow medicine?

In the future, some of the medicines you take could be grown in solar-powered green algae cells.

If Professor Ben Hankamer, Dr Melanie Oey and their team are successful, algae could become miniature factories capable of producing a wide range of medicines such as vaccines and improved treatments for conditions such as stroke.



Professor Hankamer's research initially focused on studying how plants, including single-cell green algae, known as microalgae, capture solar energy and CO_2 and use them to produce the food, fuel, clean water and atmospheric oxygen that support life on Earth.

These characteristics make single-celled algae the basis for exciting biotechnology for the production of renewable fuels. Renewable fuels are critical to address climate change as fuels account for 80 per cent of the world's energy demand and curbing the use of fossil fuels is critical to reduce CO_2 emissions.

But the production of cheap renewable fuels is challenging. So Professor Hankamer and his team have focused on the production of high value products in algae on the path to developing economically viable algal fuel production processes.

"Algae naturally manufacture a vast array of small proteins, or peptides, which form the building blocks of many types of therapeutics such as vaccines and antibiotics. Peptide production in microalgae opens up the ability to design an almost infinite number of peptides with a large variety of functions and produce them using the power of the sun," Dr Oey said.

"By tweaking their genetic code via the introduction of engineered genes, we develop algae that can produce these peptide therapeutics. Peptide therapeutics have a high-value, so they offer near-term economic opportunities as we work towards driving down the cost of renewable fuel production."

To achieve his mission of using solar-powered algae to manufacture peptides, fuels, foods and more, Professor Hankamer has assembled a global team with collaborators from 30 leading groups across Europe, the US, Asia and Australia into the Centre for Solar Biotechnology.

But sometimes, the perfect collaborator is closer than you might think.

Sitting in the office right next door to Professor Hankamer is Professor Glenn King, who studies the venom of spiders, centipedes, assassin bugs and other venomous species to develop new peptide therapeutics and bioinsecticides.

These two researchers joined forces to produce an innovative new algal production system for making a peptide stroke therapeutic, Hi1a, discovered in the venom of spiders.

Professor Hankamer said this partnership with Professor King would never have occurred without the ability of IMB to encompass both environmental and biomedical research under the broader banner of life sciences.

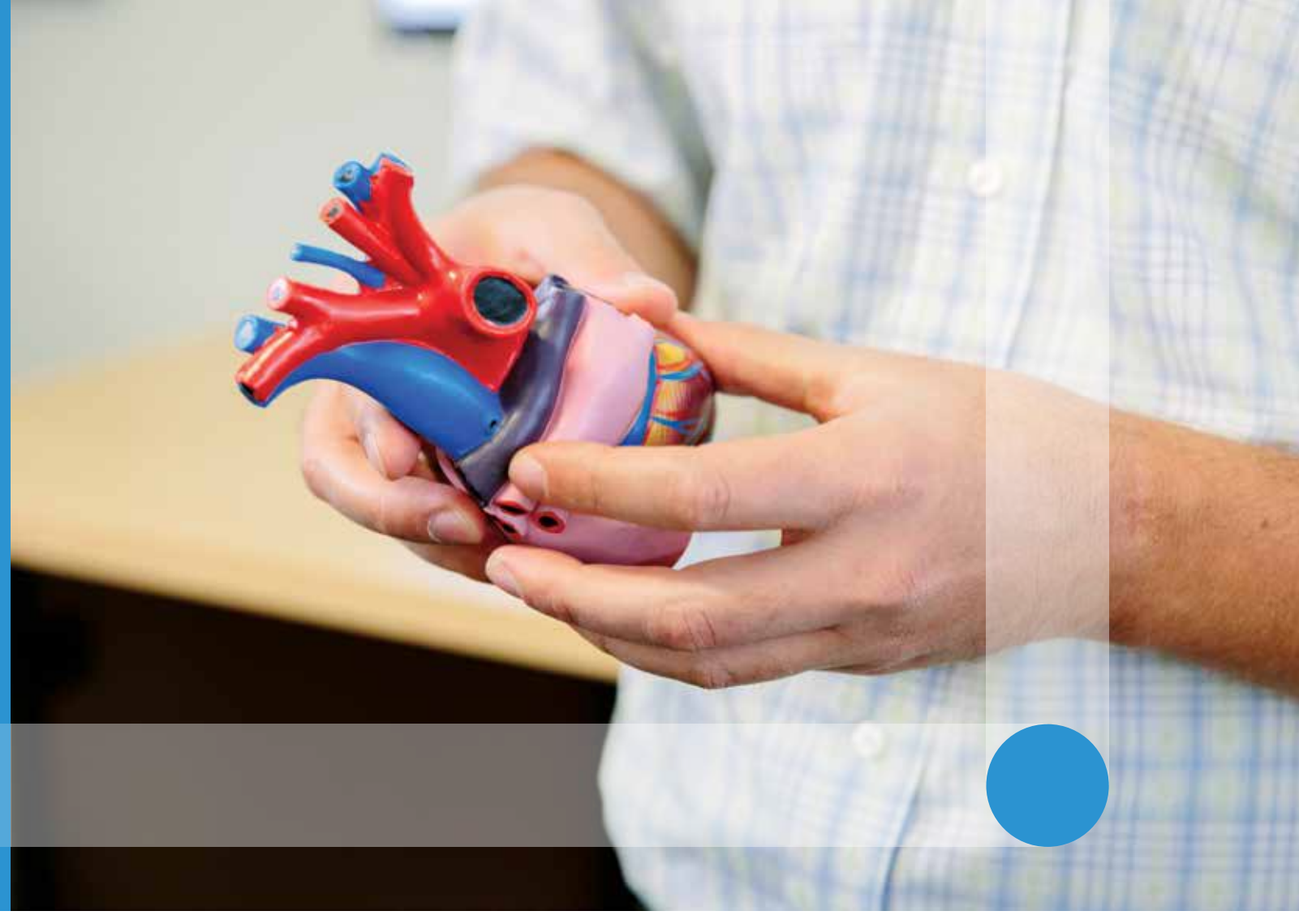
"Some of the most important advances in science occur at the interface between disciplines; the IMB with its broad range of disciplines, from genomics to drug development, provides unique interfaces at which researchers can interact and develop new breakthroughs," he said.

"Moreover, the IMB has recognised strength in peptide therapeutics, so many more exciting opportunities are likely to emerge."

The medicines of the future could be produced affordably and quickly in emerging algae biotechnologies based on these tiny green single-celled organism: algae.

Giving life – a radical plan to increase heart and lung transplants

Right now, about 1500 people are on a waiting list for a second chance at life. With organ donors rare and donation requirements stringent, wait times are at least six months before a patient will receive an organ that could save or transform their life. Sadly, many never get the chance.



Researchers at IMB hope to slash these wait times by improving transplant and preservation strategies for donor hearts and lungs.

An outstanding multidisciplinary team from IMB and The Prince Charles Hospital are partnering with industry, health sectors and consumers to help those affected by severe cardio-respiratory diseases.

IMB's Dr Nathan Palpant and Professor Glenn King are part of the team working to improve the success rate of heart transplants by creating new drugs to improve the viability of donor organs.

"Outside the body, organs have a limited lifespan, and within a matter of hours they will no longer be viable for transplantation. For a heart, this window of opportunity is only four to six hours after surgery, which provides a very limited time for a transplant to take place," Dr Palpant said.

Dr Palpant studies heart development using human stem cells, and has successfully developed cell types of the cardiovascular system, including cells to make heart muscle and vascular cells that make blood vessels.

"Understanding how to make cells of the cardiovascular system from stem cells is critical for disease modelling, drug discovery and developing novel cell therapeutics for tissue regeneration.

"Using human heart models generated through stem cell technology, our team will test promising new drugs that may protect the heart and delay the speed at which deterioration begins."

IMB researchers are currently working to develop drug leads which have shown promise in effectively protecting the viability and functionality of organs.

"One of the drug candidates we will be evaluating is a novel peptide derived from spider venom, discovered by Professor Glenn King's lab at IMB, that could protect hearts from ischemic injury and subsequently prolong their viability," Dr Palpant said.

To assist with testing these drug leads to develop innovative treatments for heart disease, researchers are working with international leaders in cardio-respiratory disease and therapy including Professor John Fraser at The Prince Charles Hospital as well as Professor Peter MacDonald, a cardiologist and research scientist at the Victor Chang Cardiac Research Institute in Sydney.

From shaping the research question and solutions right through to putting their findings into practice, a multidisciplinary team of researchers, clinicians, patients and advocacy groups are involved throughout the entire process. They are utilising a more integrated process to fast-track translation and create a greater impact, sooner.

By integrating UQ's innovative research discoveries with clinical care practices, the team are well poised to deliver globally unique outcomes that address significant clinical issues in cardiovascular medicine.

Fatal spider venom could protect against post-stroke brain damage

When a stroke attacks, blood flow to the brain is suddenly interrupted. Brain cells are deprived of oxygen and immediately begin to die. In fact, up to 1.9 million brain cells succumb every minute.

Stroke can happen to anyone, and it claims six million lives worldwide each year. A further five million stroke survivors are left with a permanent disability.

Currently, no treatments are available to limit brain damage and disability after stroke, however a world-first discovery by researchers at UQ's Institute for Molecular Bioscience is set to turn this around and provide better outcomes for stroke survivors.

Secret ingredient found in deadly bite

Professor Glenn King and his research partners at The University of Queensland and Monash University discovered a peptide in the venom of funnel-web spiders that could drastically reduce brain damage following stroke.

"We believe we have, for the first time, found a way to minimise the effects of brain damage after a stroke," he said.

"We discovered a small protein, Hi1a, that potently blocks acid-sensing ion channels in the brain, which are key drivers of brain damage after stroke. Remarkably, this peptide was found in venom of the lethal Australian funnel-web spider."

"If Hi1a also proves to be safe for patients with stroke caused by a brain haemorrhage, it could be administered in the ambulance without the need of a brain scan."

Protection against stroke injury

During preclinical studies, researchers found a single dose of Hi1a administered up to eight hours after stroke protected brain tissue and drastically improved neurological performance.

"We found brain damage was reduced by 80 per cent when Hi1a was administered two hours after stroke. Even when administered eight hours after stroke onset, the amount of brain damage was reduced by about 65 per cent," Professor King said.

"This is a remarkably long window of opportunity for treatment, which makes it a promising drug lead, as about 60 per cent of stroke patients do not reach an emergency room until at least two hours after onset of stroke. It would be particularly useful for patients in rural and regional areas, who need to travel further to access their nearest hospital."

Researchers are currently looking for funding to take the compound into clinical trials. If clinical trials are successful, Hi1a could transform treatment and outcomes for stroke patients, as there are currently no stroke treatments on the market that can protect the brain.

There is only one approved drug treatment for stroke caused by a blood clot, which works to dissipate the clot. Unfortunately this drug treatment also thins the blood, and therefore it is unsuitable for patients whose stroke is caused by a haemorrhage rather than blockage of an artery.

"If Hi1a also proves to be safe for patients with stroke caused by a brain haemorrhage, it could be administered in the ambulance without the need of a brain scan. This would minimise fatalities and provide much better outcomes for survivors of stroke in terms of minimising brain damage," Professor King said.

This research project involved scientists from UQ's Institute for Molecular Bioscience, School of Biomedical Sciences, Queensland Brain Institute, and Centre for Advanced Imaging; and Monash University's Biomedicine Discovery Institute and Department of Pharmacology.

- **Featured** Funnel web spider

Research Training

Developing future leaders

The connected, vibrant and dynamic environment at IMB supports HDR students to strive towards their goals and become tomorrow's leaders. Our students follow their dreams.

32

countries

represented in IMB's student cohort

99

Honours, undergraduate, occupational trainee and coursework masters students

hosted at IMB

126

research higher degree

active students

21

research higher degree

students graduated

Connecting young researchers with industry leaders

IMB launched a pilot study of a new Industry Mentor Program, an initiative of IMB's Translation Sub-Committee, to connect the next generation of young researchers with industry leaders.

The program is designed to expose IMB Early Career Researchers and PhD students to career options outside of academia, and provides one-to-one mentorship to explore pathways that link discovery science to industry and the broader community.

An exceptional group of 12 industry leaders provided mentorship to highly engaged young researchers at IMB, empowering them by deepening their level of understanding of research translation and the drivers and attributes needed to build a career in their area of interest.

Developing capable, globally minded graduates

In addition to mentorship from research and industry leaders, students are encouraged to broaden their skill sets by participating in various workshops and events, for example:

- workshops and seminars run by UQ's Graduate School, such as 'Communicating in a global environment' and 'Strategic networking'
- a Research Commercialisation Workshop, run by UQ's commercialisation company, UniQuest
- HealthHack, a nation-wide event that brings together medical researchers, health professionals, software developers, engineers and designers, to find solutions to important health problems.

Students at IMB are encouraged to attend conferences to help them create and expand their networks. To support them in this aim, IMB provides Higher Degree Research students with a $2000 travel scholarship to present their research at a domestic or international conference.

"I've had a range of interesting discussions with my mentor on anything from career planning to management philosophy, which have helped me begin to shape my career beyond higher degree research. It is particularly helpful that the conversations have been centred around my own unique set of strengths, interests, and goals."

Emma Livingstone, PhD student

Above Emma Livingstone

Celebrating
student success

PhD student James Hill was awarded the **Fulbright Queensland Postgraduate Scholarship** to assess how well promising Parkinson's disease drugs cross the blood-brain barrier. James will spend 10 months at the University of Michigan in the US, undertaking research and training in sophisticated imaging techniques to better understand how these promising drug candidates enter the brain.

James Hill was also a winner of the **Bridge Program** pitching competition, a national program aimed at bridging the knowledge gap between research and approved medicines.

PhD students Marija Kojic, Suchita Gera, Georgianna Oguis and Tim Stephens were awarded **IMB Entrepreneur Training Awards** in 2017, in recognition of the entrepreneurial ability and skills gained through experience, training and practical application during their course of studies at IMB.

PhD student Jake Parker made the finals of the **AMP Ignite Amplify Your PhD** competition. As part of this competition he ran a successful crowdfunding campaign to progress his research project developing a point-of-care test for patients using biosensors.

PhD student Samantha Nixon was awarded a **Westpac Future Leaders Scholarship**, to develop better treatments for drug-resistant parasitic worms to help Aussie sheep farmers. Samantha was one of only 22 young Australians to receive the impressive accolade, which includes a nine-month bespoke leadership development program and international experiences of up to six months.

Honours students Belinda Burgess and Daniel Hohenhaus from IMB's Sweet group received **University Medals** at UQ's graduation ceremony. University medals are awarded to UQ graduates who achieve outstanding academic results for the duration of their program.

PhD student Andrew White had a unique opportunity to network with Nobel Prize winners at the 67th Lindau Nobel Laureate Meeting. Andrew was one of 400 of the world's most talented young scientists invited to the meeting to mingle with more than 30 of the world's leading researchers.

A PhD student **James Hill** (centre) with honours student **Meg Bongers** (left) and **Dr Avril Robertson** (right).

B Westpac Future Leaders Scholarship recipient and PhD student **Samantha Nixon**.

2017 HDR Conferrals

Name	Supervisor	Degree	Thesis Title
Sungmin Baek	Professor Ben Hogan	PhD	Characterisation of novel molecular mechanisms of lymphatic vascular development
Guillaume Bernard	Professor Mark Ragan	PhD	Scalable alignment-free approaches in microbial phylogenomics
Irene Chassagnon	Professor Glenn King	PhD	Peptide modulators of ASIC1a: A putative drug target for the treatment of stroke
Wenhan Chen	Associate Professor Lachlan Coin	PhD	Characterizing copy number alterations in low purity cancers using haplotype phasing
Gamma Chi	Professor Ben Hankamer	PhD	Biophysical and Structural Studies of *Escherichia coli* Mechanosensitive Channel of Large Conductance in Lipid Bilayers
Sing Yan Er	Professor Glenn King	PhD	Biotechnological applications of spider venom peptides
Wooram Jung	Professor Rob Parton	PhD	Cell-free caveola formation as a system for high throughput interaction analysis
Sanjaya KC	Professor Matthew Cooper	PhD	Novel nanoparticle based diagnostic methods and tools for detection of biomarkers in clinical samples
Hyun Jae Lee	Associate Professor Lachlan Coin	PhD	Understanding disease pathogenesis through RNA sequencing
Xuan Liang	Professor Alpha Yap	PhD	Cortactin tyrosine phosphorylation at E-cadherin junctions: a switch for epithelium formation through regulation of RhoA
Justin Mitchell	Professor David Fairlie	PhD	Towards ligand directed control of GLP-1R signalling
Jeroen Overman	Associate Professor Mathias Francois	PhD	Pharmacological modulation of SOX18 transcription factor activity in development and disease
Wanida Phetsang	Professor Matthew Cooper	PhD	Azide-antibiotics and fluorescent probes
Pritesh Prasad	Professor Rob Capon	PhD	Marine biodiversity: exploring bioactive chemical space
Clarissa Rios Rojas	Professor Peter Koopman	PhD	Molecular genetics of murine testicular germ cells during fetal development
Jessica Rowley	Professor David Fairlie	PhD	Title embargoed
Jasmin Straube	Kim Ahn Le Cao	PhD	Development of statistical tools for integrating time course 'omics' data
Hongyang Wang	Professor George Muscat	MPhil	Exploring the Function of the Nuclear Receptor Coregulator, TRIP13, in Breast Cancer
Weijun Xu	Professor David Fairlie	PhD	Computer Modeling of Protein-Ligand Interactions at Cell Surfaces
Kerstin Christine Zoidl	Professor Brandon Wainwright	PhD	The relationship between Patched and Sox9 in regulating skin stem cells, wound response and skin tumorigenesis

Engagement

Research partnerships

Venom research inspires drug discovery initiative

They are some of Australia's deadliest creatures, yet IMB researchers just can't stay away from them. That's because animals like centipedes, spiders, cone snails and snakes produce valuable toxins in their venom that can be used for new drug leads to treat conditions like chronic pain, stroke and epilepsy.

Venom is now the driving inspiration behind a treatment for a common gastrointestinal disease, following a new partnership between IMB and Danish biotech company Zealand Pharma.

The deal combines IMB's expertise in identifying therapeutically-relevant bioactive peptides from venoms, with the peptide drug discovery and development expertise of Zealand Pharma.

IMB Director Professor Brandon Wainwright said IMB has joined forces with a pioneering biotechnology company at the forefront of peptide drug innovation.

"Zealand Pharma has revolutionary capabilities and an impressive track record in peptide drug discovery and development," he said.

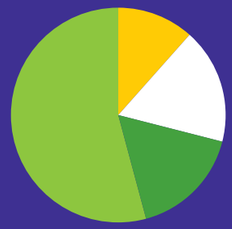
"Their capabilities will truly complement IMB's expertise and peptide technologies, which we combine to identify novel bioactive peptides from venoms. We look forward to working together to create innovative treatments that will improve the lives of those living with gastrointestinal and metabolic diseases."

Researchers will work with Zealand Pharma to characterise venom-derived peptides that act against a range of drug targets to identify new drug candidates for development.

5
New patents filed

7
New Collaborative Research Agreements
with industry partners

35
Patent families managed



Patent families managed

- **4** Agricultural/industrial biotechnology
- **6** Diagnostic/devices
- **6** Drug discovery tools
- **19** Therapeutics

IMB spinout Protagonist
entered into a $1B worldwide agreement
to co-develop a drug for inflammatory bowel disease

IMB is a partner in the
ARC Training Centre for Biopharmaceutical Innovation

6
Active Australian Research Council Linkage Projects
with industry partners

$1B agreement for inflammatory bowel disease

IMB spin-out company Protagonist Therapeutics is another example of Queensland-based discovery research attracting interest from a major global organisation. Protagonist was founded by IMB's Associate Professor Mark Smythe in 2001.

World-class discovery research by Associate Professor Smythe's lab at IMB lays important groundwork for developing new global medicines to treat inflammatory bowel disease (IBD), including Crohn's disease and ulcerative colitis.

In 2017, Protagonist entered into a worldwide agreement with Janssen to co-develop and commercialise a world-first oral treatment for IBD. The novel therapy is an oral peptide drug candidate, PTG-200, and is currently in Phase 1 of clinical trials.

PTG-200 is designed to offer patients significant advantages over current injectible treatments, such as improved convenience, and enhanced safety and tolerability. The development of an oral drug with few side effects would benefit millions of people worldwide.

Protagonist Therapeutics is now headquartered in Newark, California, with its pre-clinical and clinical staff in California, and discovery operations in California and here at UQ IMB in Brisbane, Australia.

Enriching collaboration

Our collaborations are generated through both outreach on our part and through partners proactively seeking out our expertise. Engaging with leaders and organisations across a range of sectors allows us to create partnerships designed to embed discovery from the beginning of the problem-solving pipeline and inform how we tackle some of the world's greatest challenges.

Our inaugural IMB Research Engagement dinner connected some of the brightest scientific and business minds across a range of sectors: industry, government, academia, clinical, non-profit and philanthropy. These connections foster an environment where we can together deliver solutions to the problems faced by the greater community, and create positive change in our world.

Partnership and collaboration drive the research agenda of IMB.

Taking ground-breaking discoveries to inventions that transform lives relies on bringing the right people together. This is why IMB researchers are working with clinicians, industry partners and government agencies to use life sciences research to find new ways to address some of the world's greatest health and environmental challenges.

We welcome and invite enquiry through our Partnership Office (**partner@imb.uq.edu.au**).

"Our collaboration with Ben Hankamer's group at IMB has been particularly useful for us in identifying the science needed to enable commercialisation. We are very confident that we now have a solution to a 50-year problem thanks to the work we have been doing with IMB."

Garry Henderson, Principal Process Engineer, Kellogg Brown & Root Pty Ltd

● **Above Garry Henderson**

Connecting with our community

EndoWhat? Unravelling the mystery behind endometriosis

One in ten women suffer from endometriosis – a common, yet poorly understood disease that can cause chronic pelvic pain and infertility. To raise awareness of this devastating disease and share our exciting research discoveries with the community, IMB held 'EndoWhat? Unravelling the mystery behind endometriosis'. Kicking off Endometriosis Awareness Month in March, Professor Grant Montgomery joined a panel of engaging speakers, pelvic pain specialist Dr Susan Evans and EndoActive founders Syl and Lesley Freedman

Watch it here **bit.ly/2FGJO0n**

Welcome to our Biofuture

By the year 2050, the human population is forecast to expand to nine billion people, requiring 50 per cent more fuel, 70 per cent more food and 50 per cent more fresh water. Professor Ben Hankamer presented 'Welcome to our Biofuture' as part of UQ's Global Leadership Series, sharing his transformative solutions to sustaining life on earth in the face of this increasing demand for resources. In collaboration with industry, government and research partners, Professor Hankamer and his team are using microalgae to produce clean fuels, functional foods, aquaculture and livestock feeds, protein therapeutics and bioproducts.

Watch it here **bit.ly/2FPhw7g**

A Kiwi in Kowie: Bringing science to Far North Queensland

IMB student Emma Livingstone embarked on a quest to nurture the curiosity in young people from rural Australia and inspire them to consider a career in science. Travelling to Kowanyama, a remote Aboriginal community in Far North Queensland, Emma took part in Catch a Rising Star: Women in Queensland Science, one of 1000 events that took place across Australia during National Science Week. The children revelled in the joy of putting on a lab coat and participating in activities like making balloon rockets, slime, fossils and crystals.

Unique focus of new cardiovascular research centre

The new UQ Centre for Cardiac and Vascular Biology (CCVB) was officially launched in May during National Heart Week. The Centre was established to combat cardiovascular disease and brings together eight research groups from around UQ, researching cardiovascular development, regeneration and disease. Co-director and IMB Group Leader Associate Professor Ben Hogan said the CCVB recognises the need for a multi-disciplinary approach to cardiovascular disease, which kills one Australian every 12 minutes.

Watch it here **bit.ly/2IpvEm2**

A (L to R) **Sylvia Freedman** and **Leslie Freedman** at 'EndoWhat? Unravelling the mystery behind endometriosis'

B A Kiwi in Kowie - one of the students **Emma Livingstone** met from Kowanyama Aboriginal Community in Far North Queensland

C (L to R) **Associate Professor Ben Hogan** and **Professor Wally Thomas**, Co-Directors of a new cardiovascular research centre

Supporting our partners

At IMB, we help our partners by supporting their education and networking initiatives. In December IMB hosted an advocacy workshop for Rare Voices Australia, which armed participants with strategies to bring patient communities together and provided them with the tools to engage with all stakeholders, including government, media, pharmaceutical companies, clinicians and researchers.

Together with their partners at the Royal Brisbane and Women's Hospital MND research clinic, IMB's Wray group hosted a tour for patients with motor neurone disease who donated biological samples to the clinic for research. Guests were given the opportunity to see what happens to the sample they donate and learn how the team generates genomic information from samples.

Bringing together global health leaders in the fight against superbugs

Global leaders in the fight against antibiotic resistance gathered in Brisbane in April for the Solutions for Drug-Resistant Infections (SDRI) conference. Hosted by IMB's Centre for Superbug Solutions, the conference brought together multidisciplinary and expert teams driven to solve the challenge of drug-resistant infections through research, innovation and collaboration. Conference speakers included Chief Medical Officer for England Professor Dame Sally Davies; and Professor Ramanan Laxminarayan, Director of the Centre for Disease Dynamics, Economics & Policy in Washington, D.C.

2017 Global collaborations

571 Collaborations, 58 countries

IMB connected with industry, education, government and clinical partners around the globe to share knowledge and work together to progress research towards significant healthcare outcomes for patients.

- Australia
- USA
- United Kingdom
- England
- Germany
- France
- Netherlands
- Canada
- Scotland
- Italy
- China mainland
- Switzerland
- Sweden
- Belgium
- Ireland
- Denmark
- Japan
- Spain
- Singapore
- Wales
- Estonia
- Finland
- Austria
- South Korea
- Brazil
- Malaysia
- New Zealand
- Portugal
- Iceland
- Poland
- Norway
- India
- Saudi Arabia
- Pakistan
- Chile
- Russia
- Czech Republic
- Thailand
- Israel
- Mexico
- Cyprus
- Taiwan
- Romania
- Greece
- Qatar
- Burkina Faso
- South Africa
- Slovenia
- Argentina
- Colombia
- Hong Kong
- Indonesia
- Botswana
- Croatia
- Bosnia & Herzegovina
- United Arab Emirates
- Ukraine
- Kenya

Supporting information

IMB boards and committees

Advisory Board

Professor Melissa Brown
Executive Dean, Faculty of Science,
The University of Queensland

Professor Aidan Byrne
Provost & Senior Vice-President,
The University of Queensland

Mr Bob Christiansen
Managing Director,
Southern Cross Venture Partners

Dr Jodi Clyde-Smith
Deputy Director (Operations & Strategy)
UQ Institute for Molecular Bioscience

Professor John W Funder AC
Senior Fellow, Hudson Institute of Medical Research
Professor, Department of Medicine, Monash University; Professorial Associate, Centre for Neuroscience, The University of Melbourne; Honorary Professor, Institute for Molecular Bioscience, The University of Queensland

Dr Anand Gautam
Head, External Science & Innovation (Australia, NZ, & Southeast Asia), Pfizer

Dr Cherrell Hirst AO (Chair)
Director of Medibank Private, Gold Coast Health and Hospital Service, and RSL Care

Associate Professor Beverley Rowbotham
Director of Haematology at Sullivan Nicolaides Pathology, part of the Sonic Healthcare group; Associate Professor of Cellular and Molecular Pathology, The University of Queensland

Translation Sub-committee

Dr Mark Ashton
Executive Director, Intellectual Property Commercialisation, UniQuest

Professor Rob Capon
IMB Group Leader, Postgraduate Coordinator

Mr Bob Christiansen (Chair)
Managing Director, Southern Cross Venture Partners

Dr Cherrell Hirst AO
Director of Medibank Private, Gold Coast Health and Hospital Service, and RSL Care

Mr Andy Jane
Managing Director, Life Sciences, Talu Ventures

Professor Peter Koopman (July–Dec)
Acting Deputy Director (Research)

Associate Professor Kate Schroder
IMB Group Leader, Deputy Director of IMB Centre for Inflammation and Disease Research

Dr Brigitte Smith
Co-founder and Managing Partner, GBS Venture Partners

Professor Jennifer Stow (Jan–June)
Deputy Director (Research)

Professor Brandon Wainwright
Director

Strategic Management Committee

Dr Mark Ashton
Executive Director, Intellectual Property Commercialisation, UniQuest

Dr Jodi Clyde-Smith
Deputy Director (Operations and Strategy)

Associate Professor Lachlan Coin
Deputy Director, Centre for Superbug Solutions

Professor David Fairlie
Head, Chemistry and Structural Biology

Associate Professor Ben Hogan
Co-Director, UQ Centre for Cardiac and Vascular Biology
Co-Head, Genomics of Development and Disease

Professor Richard Lewis
Director, Centre for Pain Research

Professor Mark Ragan
Co-Head, Genomics of Development and Disease

Professor Jennifer Stow (Jan-June)
Deputy Director (Research)

Professor Peter Koopman (July-Dec)
Acting Deputy Director (Research)

Professor Matt Sweet
Director, Centre for Inflammation and Disease Research

Professor Brandon Wainwright
Director

Professor Alpha Yap
Head, Cell Biology and Molecular Medicine

Professor Grant Montgomery
Director, UQ Project Three Billion

Professor Ben Hankamer
Director, IMB Centre for Solar Biotechnology

Equity and diversity at IMB

Fostering a culture of diversity, inclusion and fairness - regardless of gender, sexuality, ethnicity, race, religion or disability.

To further increase diversity across the Institute and create an inclusive and positive environment for all staff and students, IMB created a Gender Equity Strategy in 2017.

Initiatives were put in place to:

- improve employment practices to further advance and promote the careers of women
- create an inclusive and equitable working environment where all employees feel valued, and underrepresented groups can reach their full potential
- further enhance working conditions for those with caring responsibilities.

Learn more
To find out more about IMB's initiatives to promote equity and diversity across the institute, visit **bit.ly/IMBequity**

Financial statement

Income	2015 $'000	2016 $'000	2017 $'000
Peer Reviewed Income			
ARC Grants	7,814	8,339	8,423
NHMRC Grants	16,327	15,625	17,077
State Government Grants	356	59	224
Other Peer Reviewed Grants – Domestic	1,753	2,943	5,100
Other Peer Reviewed Grants – International	3,523	3,715	2,718
Operating Income			
UQ Awarded Grants	3,377	5,296	4,253
UQ Operating Funding	14,221	14,578	15,680
Sales and Services Revenue	1,730	1,055	1,580
Other Income			
Philanthropy	335	387	261
Commercialisation	2,293	2,938	1,645
Other Income & Recoveries	905	1,741	1,281
Total Income	**52,634**	**56,676**	**58,242**

Expenditure	2015 $'000	2016 $'000	2017 $'000
Remuneration Expenditure			
Researchers	28,351	29,382	29,924
Infrastructure	2,819	2,794	2,924
Administrative	2,475	2,978	2,446
Research Expenditure			
Research Services	12,534	12,571	13,077
Commercialisation	26	44	35
Research Higher Degree Support	1,149	1,476	1,496
UQ Internal Collaborations and Agreements	950	719	728
Operating Expense			
Capital Equipment	2,735	5,832	5,646
Information Technology	606	535	717
Administration and Support	496	620	764
Infrastructure and Development	950	1,000	925
Total Operating Expenditure	**53,093**	**57,950**	**58,683**
Net Surplus/(Deficit)	**(459)**	**(1,274)**	**(441)**

2017 at a glance

Total income

57% Peer reviewed (competitive) funding

37% Operating

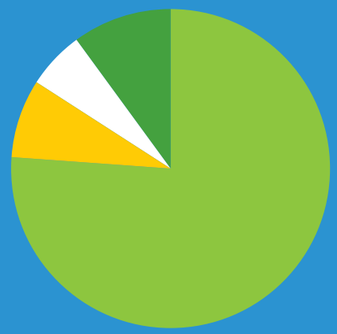
5% Philanthropy, commercialisation, other income and recoveries

Operating (core) income

20% UQ awarded grants

73% UQ operating funding

7% Sales and services revenue



Distribution of expenditure

77% **$45.2M** Research

8% **$4.6M** Infrastructure

5% **$3.2M** Administration

10% **$5.6M** Capital equipment

Research grants

Newly awarded grants commencing in 2017 totalled $31,988,245.

IMB researchers are indicated in bold.

Granting body	Investigators	Project title	Duration	Total grant
Australian Cancer Research Foundation	**WAINWRIGHT, Brandon J; YAP, Alpha S K; STOW, Jennifer L; PARTON, Robert G; CRAIK, David J**; HAASS, Nikolas; DOLCETTI, Riccardo; **HOGAN, Benjamin** & others	ACRF Cancer Ultrastructure and Function Facility	1 year	$2,300,000
ARC Discovery Early Career Research Award	**GORDON, Emma**	Molecular signals guiding dynamic cell movement during blood vessel growth	3 years	$372,000
ARC Discovery Projects	**COIN, Lachlan J M; CAO, Minh Duc** & Loose, M	Sequencing and assembling microbial community metagenomes in real-time	3 years	$419,500
ARC Discovery Projects	**LEWIS, Richard J** & Dutertre, S	Evolution of defensive and predatory venom in cone snails	3 years	$390,000
ARC Discovery Projects	**SMITH, Kelly & PALPANT, Nathan**	Understanding the differentiation of the endocardium	3 years	$428,000
ARC Discovery Projects	**SWEET, Matt**	Demystifying histone deacetylase functions in immune cells	3 years	$457,000
ARC Linkage Infrastructure, Equipment and Facilities	**ALEWOOD, Paul F; CRAIK, David J**; Cummins, S; **LEWIS, Richard J; KING, Glenn F**; FRY, Bryan G; Wang, T; Polkinghorne, A & others	Deep Protein Sequencing, Structure and Quantification Facility	1 year	$450,000
ARC Linkage Infrastructure, Equipment and Facilities	Cox, N; Mackay, J; McCamey, D; Dixon, N; Swiegers, G.; Otting, G; **KING, Glenn F**; Badger, M; Coote, M; Harmer, J; D'Alessandro, D; Lay, P; Lubitz, W	Australian high field electron paramagnetic resonance (EPR) facility	1 year	$650,000
ARC Linkage Infrastructure, Equipment and Facilities	Poulsen, S; Martin, J; Avery, V; Quinn, R; Baell, J; Scanlon, M; **COOPER, Matthew**; Booker, G. & others	Acoustic liquid handling robotics for assay-ready microplate production	1 year	$315,000

Granting body	Investigators	Project title	Duration	Total grant
ARC Linkage Infrastructure, Equipment and Facilities	**STOW, Jennifer L**; **PARTON, Robert G**; Hardeman, E; HILLIARD, Massimo A; Richard, D; Mahalingam, S; Clements, J; Macdonald, J & others	Lattice light sheet microscopy for imaging biology in real space and time	1 year	$550,000
ARC Linkage Project	**Alexandrov, Kirill**; Murphy, Linda	Ultrasensitive electrochemical biosensors	3 years	$662,432
Cancer Council Queensland	**YAP, Alpha S K** & Daly, R.	Down-regulation of RhoA signaling mediates HGF/MET-induced tumor progression	2 years	$200,000
CSIRO Future Science Fellowship in Synthetic Biology	**WHITFIELD, Jason**	Modular protein biosensors of secondary metabolites	3 years	$211,398
Ferring Research Institute	**KING, Glenn**	Venome-derived Nav1.1 inhibitors as novel candidates for treating chronic visceral pain associated with Irritable Bowel Syndrome	1 year	$91,984
Global Connections Fund Bridging Grant	**BLASKOVICH, Mark A**	Antibody-antibiotic conjugates to treat drug-resistant Gram-ve infections	1 year	$50,000
Innovation Connections	**BLASKOVICH, Mark A** & **ZIORA, Zyta M**	Natureceuticals from post-production wine extracts	6 months	$69,301
Innovation Connections	**BLASKOVICH, Mark A**	Natureceuticals from post-production wine extracts	1 year	$70,000
International Association for the Study of Pain	**DEUIS, Jennifer**	Developing novel treatment approaches for the rare genetic disease inherited erythromelalgia	1 year	$26,483
Logan City Council	**CAPON, Robert**	Cane Toad Challenge: Logan City	1 year	$5,000
Motor Neurone Disease Research Institute of Australia Inc	**GARTON, Fleur**; Henderson, R; NGO, Shyuan; **HENDERS, Anjali**; ZHAO, Qiongyi; **BENYAMIN, Beben**; MCCOMBE, Pamela A; **WRAY, Naomi** & others	Cell-free DNA and ALS; insight into disease mechanisms and progression	1 year	$100,000
Motor Neurone Disease Research Institute of Australia Inc	**WRAY, Naomi** & **BENYAMIN, Beben**	GWAS data for SALSA-SGC	1 year	$100,000

Granting body	Investigators	Project title	Duration	Total grant
Motor Neurone Disease Research Institute of Australia Inc	MILLARD, Stanley S & **WRAY, Naomi**	Functional analysis of ALS candidate genes	1 year	$100,000
Motor Neurone Disease Research Institute of Australia Inc	GIACOMOTTO, Jean; Kabashi, E & **WRAY, Naomi**	New and innovative polygenic approach for understanding and modelling MNDs in zebrafish	1 year	$100,000
NHMRC Career Development Fellowship	**COIN, Lachlan J M**	Development of genomic tools precision medicine in infectious disease and cancer	4 years	$470,144
NHMRC Career Development Fellowship	**GRATTEN, Jake**	Understanding the etiology of psychiatric disorders through whole genome analyses	4 years	$470,144
NHMRC Early Career Fellowship	**DE VEER, Simon**	Expanding the repertoire of immunomodulatory drugs: targeting the melanocortin system using engineered cyclic peptides	4 years	$318,768
NHMRC Early Career Fellowship	**GARTON, Fleur**	The identification of novel genetic loci and pathways associated with ALS through interrogation of multiple integrated genomics data sets	4 years	$318,768
NHMRC Early Career Fellowship	**LABZIN, Larisa**	Innate immune functions of the intracellular antibody receptor TRIM21	4 years	$408,768
NHMRC Research Fellowship	**FAIRLIE, David**	Modulating Protein-Protein Interactions In Disease	5 years	$863,910
NHMRC Research Fellowship	**LEWIS, Richard J**	Discovery and development of novel venom peptide analgesics	5 years	$763,845
NHMRC Development Grant	**COOPER, Matthew**; Hansbro, P & **ROBERTSON, Avril A B**	Novel NLRP3 inhibitors for asthma therapy		$927,117
NHMRC Development Grant	**SMYTHE, Mark L** & PHIPPS, Simon	Evaluation of the Safety of Lead Compounds for Allergic Ashtma	1 year	$310,568
NHMRC Program Grant	**VISSCHER, Peter**; **WRAY, Naomi** & **YANG, Jian**	Complex trait genomics	5 years	$6,904,815

Granting body	Investigators	Project title	Duration	Total grant
NHMRC Project Grant	BLUMENTHAL, Antje & **STOW, Jennifer L**	Innate immune signalling in Mycobacterium tuberculosis infection	3 years	$562,857
NHMRC Project Grant	**FAIRLIE, David** & **IYER, Abishek V**	Small molecule activators of glucagon-like peptide receptor	3 years	$658,152
NHMRC Project Grant	Farrell, G; **SCHRODER, Kat**e; **COOPER, Matthew**; Teoh, N & **ROBERTSON, Avril A B**	Inflammatory pathways to liver fibrosis in non-alcoholic and alcoholic steatohepatitis: reversal by NLRP3 inhibitors	3 years	$572,857
NHMRC Project Grant	Hansbro, P; **COOPER, Matthew**; Gibson, P & O'Neill, L	Elucidating the roles and mechanisms of activation of NLRP3 inflammasomes and developing therapeutic interventions for severe steroid-resistant asthma	3 years	$961,929
NHMRC Project Grant	**HOGAN, Benjamin**; Zheng, X & **LAGENDIJK, Anne**	Coupling the mechanical, signalling and transcriptional mechanisms that initiate pathogenesis of Cerebral Cavernous Malformation	4 years	$1,228,364
NHMRC Project Grant	MISHRA, Gita D; Dharmage, S; FERREIRA DE SOUSA, Isabel; Visser, J.; Loxton, D.; Huxley, R.; DOBSON, Annette J; **MONTGOMERY, Grant W** & others	M-PreM study: Reproductive factors, from menarche to pre-menopause, and the risk of cardiometabolic and respiratory conditions before menopause	4 years	$1,366,831
NHMRC Project Grant	SCHEMBRI, Mark A; **SWEET, Matt** & Ulett, G.	Understanding Uropathogenic E. coli-mediated subversion of innate immunity	4 years	$932,536
NHMRC Project Grant	**SCHRODER, Kate** & **STOW, Jennifer L**	A novel mechanism for IL-1B secretion	3 years	$608,152
NHMRC Project Grant	**SMITH, Kelly**; Bakkers, J. & **PALPANT, Nathan**	Investigating a novel genetic regulator of cardiac rhythm	3 years	$557,101
NHMRC Project Grant	**SWEET, Matt** & **FAIRLIE, David**	Combating infectious diseases by harnessing macrophage functions	3 years	$688,152

Granting body	Investigators	Project title	Duration	Total grant
NHMRC Project Grant	Thomas, D; **POWELL, Joseph**; Cowley, M & Ballinger, M	An international whole genome study to definitively map heritable risk in sarcomas	1 year	$825,000
NHMRC Project Grant	**VETTER, Irina**	Novel analgesic approaches: harnessing functional interactions between sodium channels and opioids	3 years	$329,076
NHMRC Project Grant	**YAP, Alpha S K**; NEUFELD, Zoltan & **Gomez, G**	A mechanotransduction apparatus to coordinate epithelial collective cell migration	4 years	$994,596
Queensland Government Advance Queensland Innovation Partnerships	**COIN, Lachlan J M**; Woods, M; Bialasiewicz, S; **COOPER, Matthew**; **CAO, Minh Duc**; **GANESAMOORTHY, Devika** & **BLASKOVICH, Mark A**	Rapid diagnosis of pathogenic infections	2017 – 2019	$707,875
Queensland National Parks & Wildlife Service	**CAPON, Robert**	Cane Toad Challenge: Logan City	1 year	$5,000
The Halpin Trust	**WRAY, Naomi**	Inclusion of an environmental questionnaire into SALSA online data collection	1 year	$14,810
The CASS Foundation	**CHAN, Angeline**	Travel Award: 26th FAOBMB-ConBio 2017		$2,000
The CASS Foundation	**SHAKESPEAR, Melanie**	Travel Award: Integrating Metabolism and Immunity Conference		$3,500
UQ Early Career Researcher Grant	**DEUIS, Jennifer**	Development of a high-throughput assay to screen for Nav1.9 inhibitors	1 year	$24,500
UQ Early Career Researcher Grant	**GHAI, Rajesh**	Towards the structure determination of a novel retromer-like complex	1 year	$25,000
UQ Early Career Researcher Grant	**POWELL, Joseph**	Assessing the relationship between transcription in Human iPSC-derived brain organoids and adult primary brain tissue	1 year	$10,000

Granting body	Investigators	Project title	Duration	Total grant
UQ Early Career Researcher Grant	**SWEDBEG, Joakim**	The next generation drugs targeting respiratory chronic inflammatory disorders	1 year	$24,500
UQ Major Equipment and Infrastructure	ABRAMSON, David A; RICHARDS, Linda J; MEUNIER, Frederic A; **STOW, Jennifer L**; WEPF, Roger A; **WALL, Adam**; CARROLL, Jake L & GOODHILL, Geoffrey J	The UQ Deconvolution Engine: A High Performance Image Processing Facility	1 year	$399,441
UQ Major Equipment and Infrastructure	**ALEWOOD, Paul F**; **LEWIS, Richard J**; **CRAIK, David J**; **PARTON, Robert G**; **FAIRLIE, David; WAINWRIGHT, Brandon J; KING, Glenn F**; **STOW, Jennifer L** & others	Maldi Mass Spectrometry integrated molecular discovery, quantification facility for biomarker vaccine, drug development, target validation and clinical studies	1 year	$220,188
UQ Major Equipment and Infrastructure	GOODHILL, Geoffrey J; RICHARDS, Linda J; MEUNIER, Frederic A; COOPER, Helen; MARSHALL, Justin; VAN SWINDEREN, Bruno; **PARTON, Robert G** & AMOR, Rumelo	Two-photon light-sheet microscope	1 year	$175,853
UQ Major Equipment and Infrastructure	**TEASDALE, Rohan D**; **YAP, Alpha S K**; **STOW, Jennifer L**; **HOGAN, Benjamin**; MILLARD, Stanley S; **PARTON, Robert G**; **SMITH, Kelly** & **SPRINGFIELD, James**	STED Super-resolution microscopy	1 year	$215,030

Research support facilities

In partnership with industry, government and funding agencies, IMB and UQ have invested heavily in major research infrastructure – to provide leading technologies for scientists to deliver the breakthrough discoveries that address some of the world's greatest health and environmental challenges.

IMB's research facilities span imaging, computational biology, bioinformatics, genome sequencing and analysis, statistical genetics, chemistry, structural biology and drug discovery, and high performance computing. This allows the Institute to take life science discoveries from the genome to drug design and application.

ACRF Cancer Biology Imaging Facilities

IMB researchers can now view cancer cells as they grow, spread and respond to drugs in real time, following the establishment of the ACRF Cancer Ultrastructure and Function Facility in 2017. The facility houses IMB's new Lattice Light Sheet Microscope, which is one of only three in Australia and allows researchers to observe the behaviour of cells and organisms over extended periods without damaging the cells. The new facility is the result of a $2.3 million grant from the Australian Cancer Research Foundation (ACRF) and $840,000 from the Australian Research Council Linkage Infrastructure, Equipment and Facilities scheme.

IMB also houses the ACRF Cancer Biology Imaging Facility, one of the largest and most comprehensively equipped facilities in Australia. Founded in 2010 with a $2.5 million ACRF grant, the facility houses 23 high-performance microscopes and provides on-site expert technical support and training.

Mass Spectrometry Facility

IMB's Mass Spectrometry Facility (MSF) provides researchers with state-of-the-art mass spectrometry, high-performance liquid chromatography and robotic instrumentation.

To discover what no-one has yet discovered and take mass spec analysis to the edge, IMB added a new TrippleTOF to the Institute's suite of mass spectrometers. This latest instrument allows researchers to undertake deeper analysis into complex samples due to its high resolution, speed and accurate mass.

The MSF provides technical advice and research and training support in a number of mass spectrometric applications, including investigating protein interactions and structures, amino acid sequence determination, post-translational modification discovery and quantification, compound stability, and bioavailability of potential therapeutics in a range of biological systems.

IMB Sequencing Facility

The IMB Sequencing Facility (ISF) provides sequencing services to IMB, UQ and the broader research community. The ISF provides library preparation and sequencing services on Illumina's NextSeq 500 and MiSeq platforms, and in early 2018 will be open as a service.

The facility offers sample preparation for sequencing of RNA from any species, whole exome sequencing for human DNA and whole genome sequencing for non-human species. The ISF also offers sample preparation and sequencing of custom projects including large-scale projects, for which the facility is equipped with a high-throughput sample preparation robot.

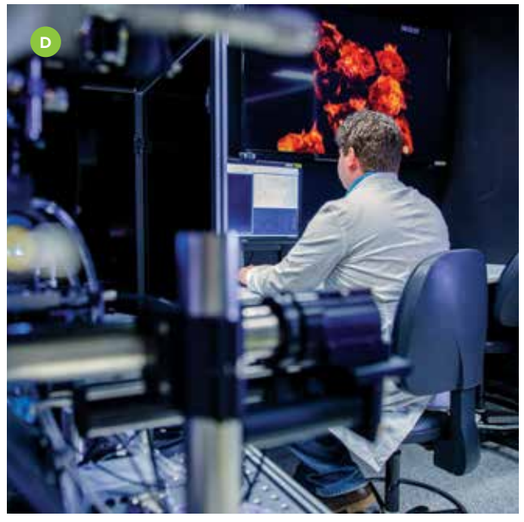
Biomolecular NMR Facility

IMB's Biomolecular Nuclear Magnetic Resonance (NMR) Facility makes the powerful technique of NMR spectrometry accessible to our research and industry clients. The facility comprises a 600 MHz spectrometer equipped with a cryoprobe and autosampler, and a 500 MHz spectrometer equipped with a robotic sample changer.

Access is also available to the extensive NMR infrastructure housed throughout IMB, most notably a 900 MHz spectrometer equipped with a cryoprobe and sample changer. The latter is an instrument of the Queensland NMR Network and is the most powerful state-of-the-art NMR spectrometer in Australia.

The Queensland Emory Drug Discovery Initiative (QEDDI)

IMB hosts QEDDI, a dedicated group of experienced drug-discovery scientists recruited from industry to translate research into real patient benefits. QEDDI offers UQ researchers the opportunity to access best-practice techniques in drug discovery and development, leveraging the cutting-edge research infrastructure available at the Institute.



Queensland Facility for Advanced Genome Editing

The Queensland Facility for Advanced Genome Editing (QFAGE) provides expert genetic modification (GM) services using CRISPR/Cas9 genome editing and standard transgenic (TG) mouse production technologies.

QFAGE offers a number of standard and bespoke genome modification services in mice, and as of 2017 has expanded operations to include genomic modification in any cell type of interest.

In 2017, 24 CRISPR mouse projects were completed. By early 2018 QFAGE will also provide a customised CRISPR library screening. QFAGE is the first and only core facility that offers comprehensive mouse and cell line genome editing services in Australia. The facility is available on a user-pays system to researchers within IMB and across UQ.

Centre for Solar Biotechnology Facility

The advanced pilot-scale test facility at Pinjarra Hills in Brisbane is a research hub for industry and university partners skilled in biotechnology, engineering and systems development.

The facility received funding in 2017 to upgrade the PC2 laboratories, as part of an overall improvement plan to include additional capabilities such as improved containment and safety, enhanced monitoring and control systems, extensive equipment upgrades and new sterilisation facilities.

Researchers and industry partners use the facility to develop high-efficiency microalgae systems and processes for the production of high value products as well as bulk commodities. These include foods, renewable fuels, advanced bioproducts and bioremediation.

QFAB Bioinformatics

QFAB Bioinformatics (QFAB) provides customised services in bioinformatics, biostatistics and biodata to life sciences and health researchers.

Working closely with researchers, QFAB team members apply data management, integration, analysis and visualisation techniques to unlock the full value of large-scale biological and clinical datasets.

QFAB develops software and web applications, as well as maintaining, hosting and supporting tools developed by researchers. IMB research projects that have been supported by QFAB include the development of a laboratory management system to track the screening activities of the Community for Open Antimicrobial Drug Discovery (CO-ADD) and deploying a computational platform to undertake large-scale multi-omics based research.

QFAB Bioinformatics partners with UQ, Queensland University of Technology and Griffith University.

UQ ROCX Crystallisation and X-ray Diffraction Facility

The UQ Remote Operation Crystallisation and X-ray Diffraction (UQ ROCX) facility provides access to world-class equipment for protein crystallisation and diffraction studies to solve crystal structures.

Services offered in 2017 included protein crystallisation condition screening, crystal diffraction screening, data collection, data processing, and structure determination.

Researchers are using the facility to draw electron density maps that resolve protein structures at atomic resolution, with applications in protein functional studies, drug design and screening fragment libraries for drug leads.

A **Dr Johnny Huang**, QFAGE facility

B IMB Sequencing facility

C **Dr Peta Harvey**, Biomolecular NMR facility

D Lattice Light Sheet Microscope, Microscopy facility

E **Mr Alun Jones** and **Dr Angeline Chan**, Mass Spectrometry facility

Publications

For a full list of 2017 publications please visit imb.uq.edu.au/2017publications

High-impact peer reviewed papers*

1. Agrawal, A., Chou, Y., Carey, C., Baranger, D., Zhang, B., Sherva, R. et al. (2017) Genome-wide association study identifies a novel locus for cannabis dependence. Molecular Psychiatry. UQ:696764 **IF:13.204**
2. Alexanian, M., Maric, D., Jenkinson, S., Mina, M., Friedman, C., Ting, C. et al. (2017) A transcribed enhancer dictates mesendoderm specification in pluripotency. Nature Communications, 8(1): 1-19. UQ:702245 **IF:12.124**
3. Bartonicek, N., Clark, M., Quek, X., Torpy, J., Pritchard, A., Maag, J. et al. (2017) Intergenic disease-associated regions are abundant in novel transcripts. Genome Biology, 18(241). UQ:715594 **IF:11.908**
4. Benyamin, B., He, J., Zhao, Q., Gratten, J., Garton, F., Leo, P. et al. (2017) Cross-ethnic meta-analysis identifies association of the GPX3-TNIP1 locus with amyotrophic lateral sclerosis. Nature Communications, 8(1). UQ:688896 **IF:12.124**
5. Bower, N., Koltowska, K., Pichol-Thievend, C., Virshup, I., Paterson, S., Lagendijk, A. et al. (2017) Mural lymphatic endothelial cells regulate meningeal angiogenesis in the zebrafish. Nature Neuroscience, 20(6): 774-783. UQ:625139 **IF:17.839**
6. Breen, S., Williams, S., Outram, M., Kobe, B. & Solomon, P. (2017) Emerging insights into the functions of pathogenesis-related protein 1. Trends in Plant Science, 22(10): 871-879. UQ:676546 **IF:11.911**
7. Brillault, L., Jutras, P., Dashti, N., Thuenemann, E., Morgan, G., Lomonossoff, G. et al. (2017) Engineering recombinant virus-like nanoparticles from plants for cellular delivery. ACS Nano, 11(4): 3476-3484. UQ:489093 **IF:13.942**
8. Byrne, E., Yang, J. & Wray, N. (2017) Inference in Psychiatry via 2-Sample Mendelian Randomization-From Association to Causal Pathway?. JAMA Psychiatry, 74(12): 1191-1192. UQ:693029 **IF:15.307**
9. Chen, W., Robertson, A., Ganesamoorthy, D. & Coin, L. (2017) sCNAphase: using haplotype resolved read depth to genotype somatic copy number alterations from low cellularity aneuploid tumors. Nucleic Acids Research, 45(5). UQ:544670 **IF:10.162**
10. Cole, J., Ritchie, S., Bastin, M., Valdes Hernandez, M., Munoz Maniega, S., Royle, N. et al. (2017) Brain age predicts mortality. Molecular Psychiatry. UQ:678702 **IF:13.204**
11. Colodro-Conde, L., Couvy-Duchesne, B., Zhu, G., Coventry, W., Byrne, E., Gordon, S. et al. (2017) A direct test of the diathesis–stress model for depression. Molecular Psychiatry. UQ:674596 **IF:13.204**
12. Culverhouse, R., Saccone, N., Horton, A., Ma, Y., Anstey, K., Banaschewski, T. et al. (2017) Collaborative meta-analysis finds no evidence of a strong interaction between stress and 5-HTTLPR genotype contributing to the development of depression. Molecular Psychiatry, 23(1): 133-142. UQ:674476 **IF:13.204**
13. Day, F., Thompson, D., Helgason, H., Chasman, D., Finucane, H., Sulem, P. et al. (2017) Genomic analyses identify hundreds of variants associated with age at menarche and support a role for puberty timing in cancer risk. Nature Genetics, 49(6): 834-841. UQ:636672 **IF:27.959**
14. Dekan, Z., Headey, S., Scanlon, M., Baldo, B., Lee, T., Aguilar, M. et al. (2017) Δ-Myrtoxin-Mp1a is a helical heterodimer from the venom of the jack jumper ant that has antimicrobial, membrane-disrupting, and nociceptive activities. Angewandte Chemie, 56(29): 8495-8499. UQ:649327 **IF:11.994**
15. Dorboz, I., Aiello, C., Simons, C., Stone, R., Niceta, M., Elmaleh, M. et al. (2017) Biallelic mutations in the homeodomain of NKX6-2 underlie a severe hypomyelinating leukodystrophy. Brain : a journal of neurology, 140(10): 2550-2556. UQ:696936 **IF:10.292**
16. Fang, J., Jia, J., Makowski, M., Xu, M., Wang, Z., Zhang, T. et al. (2017) Functional characterization of a multi-cancer risk locus on chr5p15.33 reveals regulation of TERT by ZNF148. Nature Communications, 8. UQ:714890 **IF:12.124**
17. Feigin, M., Garvin, T., Bailey, P., Waddell, N., Chang, D., Kelley, D. et al. (2017) Recurrent noncoding regulatory mutations in pancreatic ductal adenocarcinoma. Nature Genetics, 49(6): 825-833. UQ:636710 **IF:27.959**
18. Furlong, E., Lo, A., Kurth, F., Premkumar, L., Totsika, M., Achard, M. et al. (2017) A shape-shifting redox foldase contributes to Proteus mirabilis copper resistance. Nature Communications, 8. UQ:681680 **IF:12.124**
19. Fuster, J., MacLauchlan, S., Zuriaga, M., Polackal, M., Ostriker, A., Chakraborty, R. et al. (2017) Clonal hematopoiesis associated with Tet2 deficiency accelerates atherosclerosis development in mice. Science, 355(6327): 842-847. UQ:436822 **IF:37.205**
20. Ghai, R., Du, X., Wang, H., Dong, J., Ferguson, C., Brown, A. et al. (2017) ORP5 and ORP8 bind phosphatidylinositol-4, 5-biphosphate (PtdIns(4,5)P 2) and regulate its level at the plasma membrane. Nature Communications, 8(1). UQ:692003 **IF:12.124**
21. Hayward, N., Wilmott, J., Waddell, N., Johansson, P., Field, M., Nones, K. et al. (2017) Whole-genome landscapes of major melanoma subtypes. Nature, 545(7653): 175-180. UQ:618288 **IF:40.137**
22. Humphris, J., Patch, A., Nones, K., Bailey, P., Johns, A., McKay, S. et al. (2017) Hypermutation in pancreatic cancer. Gastroenterology, 152(1): 68-74.e2. UQ:416873 **IF:18.392**
23. Jin, A., Dekan, Z., Smout, M., Wilson, D., Dutertre, S., Vetter, I. et al. (2017) Conotoxin Φ-MiXXVIIA from the Superfamily G2 Employs a Novel Cysteine Framework that Mimics Granulin and Displays Anti-Apoptotic Activity. Angewandte Chemie (International ed. in English), 56(47): 14973-14976. UQ:696912 **IF:11.994**
24. Keller, A., Eckle, S., Xu, W., Liu, L., Hughes, V., Mak, J. et al. (2017) Drugs and drug-like molecules can modulate the function of mucosal-associated invariant T cells. Nature Immunology, 18(4): 402-411. UQ:504283 **IF:21.506**
25. Kerr, M., Gomez, G., Ferguson, C., Tanzer, M., Murphy, J., Yap, A. et al. (2017) Laser-mediated rupture of chlamydial inclusions triggers pathogen egress and host cell necrosis. Nature Communications, 8. UQ:523256 **IF:12.124**
26. Kim, R., Pinkerton, J., Essilfie, A., Robertson, A., Baines, K., Brown, A. et al. (2017) Role for NLRP3 inflammasome-mediated, IL-1β-dependent responses in severe, steroid-resistant asthma. American Journal of Respiratory and Critical Care Medicine, 196(3): 283-297. UQ:678974 **IF:13.204**
27. Lagendijk, A., Gomez, G., Baek, S., Hesselson, D., Hughes, W., Paterson, S. et al. (2017) Live imaging molecular changes in junctional tension upon VE-cadherin in zebrafish. Nature Communications, 8(1). UQ:696737 **IF:12.124**
28. Liang, X., Budnar, S., Gupta, S., Verma, S., Han, S., Hill, M. et al. (2017) Tyrosine dephosphorylated cortactin downregulates contractility at the epithelial zonula adherens through SRGAP1. Nature Communications, 8(1). UQ:690189 **IF:12.124**
29. Lohman, R., Hamidon, J., Reid, R., Rowley, J., Yau, M., Halili, M. et al. (2017) Exploiting a novel conformational switch to control innate immunity mediated by complement protein C3a. Nature Communications, 8(1). UQ:682702 **IF:12.124**
30. Lu, H., Galeano, M., Ott, E., Kaeslin, G., Kausalya, P., Kramer, C. et al. (2017) Mutations in DZIP1L, which encodes a ciliary-transition-zone protein, cause autosomal recessive polycystic kidney disease. Nature Genetics, 49(7): 1025-1034. UQ:674417 **IF:27.959**
31. Lukowski, S., Lloyd-Jones, L., Holloway, A., Kirsten, H., Hemani, G., Yang, J. et al. (2017) Genetic correlations reveal the shared genetic architecture of transcription in human peripheral blood. Nature Communications, 8(483). UQ:688830 **IF:12.124**
32. Luo, L., Bokil, N., Wall, A., Kapetanovic, R., Lansdaal, N., Marceline, F. et al. (2017) SCIMP is a transmembrane non-TIR TLR adaptor that promotes proinflammatory cytokine production from macrophages. Nature Communications, 8. UQ:436831 **IF:12.124**

33. Macé, A., Tuke, M., Deelen, P., Kristiansson, K., Mattsson, H., Nõukas, M. et al. (2017) CNV-association meta-analysis in 191,161 European adults reveals new loci associated with anthropometric traits. Nature Communications, 8(1). UQ:692026 **IF:12.124**

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39. Peyrot, W., Van der Auwera, S., Milaneschi, Y., Dolan, C., Madden, P., Sullivan, P. et al. (2017) Does childhood trauma moderate polygenic risk for depression? A meta-analysis of 5,765 subjects from the Psychiatric Genomics Consortium. Biological Psychiatry. UQ:688922 **IF:11.412**

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41. Sapkota, Y., Steinthorsdottir, V., Morris, A., Fassbender, A., Rahmioglu, N., De Vivo, I. et al. (2017) Meta-analysis identifies five novel loci associated with endometriosis highlighting key genes involved in hormone metabolism. Nature Communications, 8. UQ:625361 **IF:12.124**

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46. Wu, Y., Zheng, Z., Visscher, P. & Yang, J. (2017) Quantifying the mapping precision of genome-wide association studies using whole-genome sequencing data. Genome Biology, 18(1). UQ:617720 **IF:11.908**

47. Yeoh, Y., Dennis, P., Paungfoo-Lonhienne, C., Weber, L., Brackin, R., Ragan, M. et al. (2017) Evolutionary conservation of a core root microbiome across plant phyla along a tropical soil chronosequence. Nature Communications, 8(1). UQ:681660 **IF:12.124**

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*** Impact factor >10**

Where the help is most needed

Support us in treating brain cancer in children

Brain cancer is the most common cause of cancer-related deaths in children, adolescents and adults under 40. Professor Brandon Wainwright and his team have advanced the world's understanding of children's brain cancer and are now developing more effective, safer treatments that shrink tumours and improve survival and quality of life.

With your help, we can develop and take to clinical trials personalised treatments that specifically target the tumour of each individual patient, giving them a better chance of beating the odds.

Help sufferers of cardiovascular disease

Cardiovascular disease is a major cause of death in Australia, killing one Australian every 12 minutes, with an estimated 4.2 million people living with this disease in 2014-2015. Dr Nathan Palpant and his group are developing a way to treat damaged hearts with heart cells grown from stem cells.

In the future, patients suffering heart attacks, strokes, or other type of heart disease could receive these new heart cells to grow inside their diseased hearts, replacing the damaged sections. Your donation can make a huge difference and bring this research closer to reality.

Help us fight kidney disease to avoid dialysis and transplantation

IMB's Professor Jennifer Stow is using one of the world's most powerful live imaging microscopes to see kidney cell defects in real time. This ability is allowing Professor Stow and clinical fellow Dr Andrew Mallett to understand the disease process and investigate how to fix damaged kidney cells – a giant and exciting step forward for this research.

Your donation will help our researchers investigate the underlying cell defects in polycystic kidney disease, and uncover the genetic factors behind kidney development to find new approaches to treat kidney disease, a devastating condition which affects 1.7 million Australians.

Support us in using molecules from venom to prevent stroke

Some of the deadliest creatures on Earth may hold the key to the next generation of painkillers and treatments for other debilitating diseases.

Professor Glenn King and Dr Irina Vetter are exploring the chemical cocktails present in the venom of animals such as spiders and cone snails to uncover new treatments for pain, stroke and epilepsy.

Stroke is the second leading cause of death worldwide, and the third biggest killer in Australia.

Six million people die of stroke each year and 5 million survivors are left with permanent disability.

Despite this massive global disease burden, there are no approved drugs for preventing the brain damage that occurs during stroke.

Due to the lack of treatment options, stroke causes extreme morbidity, with 50% of stroke survivors still requiring daily care one year after their stroke.

Your donation to our stroke program will fast-track a promising therapy that could reverse this wave of post-stroke neurological damage, reducing deaths from stroke and dramatically enhancing the quality of life for stroke survivors.

Help us grow affordable medicines in plants

Imagine a future where you take medication by eating a sunflower seed or potato chip, or by drinking a cup of tea. Professor David Craik and his team are developing plants with the ability to grow pharmaceuticals designed by his team to treat diseases such as pain, cancer (prostate cancer, chronic myeloid leukaemia and melanoma), cardiovascular disease, multiple sclerosis, and metabolic diseases (obesity and diabetes).

Your donation to this work has the potential to create change on a global scale through the provision of affordable pharmaceuticals that could have fewer side effects than current medications, improving the lives of people around the world in both developed and developing nations.

- **Above** Pain researcher Associate Professor Irina Vetter

For more information about our projects or to make a gift today, please visit **imb.uq.edu.au** or email **giving@imb.uq.edu.au**

Thank you to
our major supporters

The Institute for Molecular Bioscience acknowledge with thanks our supporters who have donated to various research programs throughout 2017.

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