
QUT
Centre for
Biomedical
Technologies
Partnering for a
healthier future

*Cover: Professor Yi-Chin Toh and Kushagra Jain*
*Inside front cover: Professor Shaun Gregory and team*

QUT acknowledges the Turrbal and Yugara, as the First Nations owners of the lands where QUT now stands. We pay respect to their Elders, lores, customs and creation spirits. We recognise that these lands have always been places of teaching, research and learning. QUT acknowledges the important role Aboriginal and Torres Strait Islander people play within the QUT community.

# We discover, develop and deliver the next frontier of biomedical technologies.

The Centre for Biomedical Technologies (CBT) works at the intersection of medicine and technology, where extraordinary breakthroughs are possible when technology is harnessed to enhance the body's inherent capabilities to adapt and repair.

We devise solutions that blend biological expertise with engineering acumen, complemented by clinical insight to ensure our advances are attuned to the needs of patients, healthcare workers and the health ecosystem.

Our researchers specialise in medical devices, modelling and evaluation, biomaterials, precision imaging, and smart solutions—sensors, robotics, AI and remote monitoring.

CBT contributes to Queensland University of Technology's ranking of #1 in Australia and #16 in the world for biomedical engineering, and we have a demonstrated ability to take discoveries from the research bench to the real world. We also train the next generation of biomedical leaders.

Our partners are an integral piece of our commitment to deliver transformative technologies. You don't just bring us problems to solve—you provide crucial scientific, clinical and commercial understanding that shapes our work. Together, we co-create solutions that improve the lives of patients, empower clinicians and strengthen healthcare systems.

Our researchers have partnered to develop:

- 3D-printed scaffolds for bone regeneration
- a mini pump designed to improve blood flow in patients whose hearts don't fill properly between beats
- bespoke theatre mattresses for spinal surgery patients with atypical anatomy
- a flexible but durable implant that helps challenging fractures to heal
- 3D models and organs-on-chips that mimic tissue and its surrounding environment to enable tailored cancer treatment and more efficient drug development
- a low-cost, portable scanner and 3D printer to diagnose and help treat lower limb conditions
- AI tools for automatic interpretation of medical images for faster, more accurate diagnosis
- a 3D modelling tool that contributed to the development of better-fitting implants for hip fractures
- wearable sensors that monitor heat, stress and performance.

**30+ research groups**

**250 researchers**

**#1 in Australia for biomedical engineering**

**50+ key industry and clinical partners**

**100+ PhDs and fellows trained in the last 5 years**


*(L-R): Simon Dyer (CEO, Sealy Australia), Adj Professor/Dr Geoffrey Askin, Vice-Chancellor and President Professor Margaret Sheil AO, Associate Professor Paige Little, Adj Professor/Dr Robert Labrom, Daniel Green (R&D Director, Sealy Australia), Emeritus Professor Mark Pearcy*

# Why partner with CBT

The Centre for Biomedical Technologies (CBT) has the expertise, experience and ecosystem to help you overcome challenges and achieve your goals. We unite leading researchers from diverse disciplines across the faculties of Engineering, Health and Science, supported by advanced infrastructure and the know-how needed to move from discovery to delivery.

If you want to join us at the frontier of biomedical technologies, please get in touch.

We offer:

## Collaborative research

Work together with us to develop innovative solutions to your problems, while potentially leveraging government funding schemes designed to support industry-university collaborations.

## Commercial research and consultancy

Access our specialised knowledge and leading-edge facilities in a cost-effective way that drives outcomes for your organisation.

## Visiting industry and clinical fellowships

Join CBT as a visiting fellow to engage in research in a vibrant community with deep connections to industry and major hospitals, and the country's highest ranking for biomedical engineering.

## Higher Degree Research student internships

Our students bring specialised and transferable skills, innovative thinking and the ability to manage a research project. Welcoming a student to be embedded in your workplace will provide you with a fresh perspective and access to future leaders.

# Our capabilities

We are home to researchers from a broad range of fields, with expertise across engineering, biology, medicine, technology and more. If you need a capability in biomedical technologies, it's likely we can connect you with someone.

We are internationally regarded for our capabilities in:

Medical device design and development

Modelling, evaluation and simulation

Medical imaging

Materials and tissue integration

Tissue engineering

Bioelectronics and sensors

Medical robotics

AI and machine learning

Remote monitoring

Disease diagnostics

Drug modelling and testing

Biomechanics

Biomaterials

Biofabrication and 3D printing

Biology

Surgery and surgical planning

Clinical training tool development

*Associate Professor Devakar Epari holding a Biphasic Plate*

# Our impact areas

Musculoskeletal system and disorders

Cardiovascular disease

Cancer

Diagnostics

Surgery

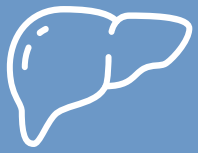
Regenerative medicine

Stress, heat and performance monitoring

Infection

Wound healing

Brain and mental health



Liver health


*Medical Engineering Research Facility (MERF)*

# Our facilities

Our facilities enable discovery and development by providing our researchers with the tools to explore their ideas in greater depth, uncover new insights and translate their work to the clinic.

We can access state-of-the-art facilities across QUT and at major Brisbane hospitals, including:

## Medical Engineering Research Facility (MERF)

MERF (pictured left) offers state-of-the-art surgical theatres and pre-clinical laboratories and is located at Prince Charles Hospital—Australia's largest cardiothoracic unit and a hub for specialist needs in disciplines such as orthopaedics. This co-location ensures any advances can be easily replicated in a hospital environment, meaning a seamless transition from lab to clinic. It supports research and training in medical devices, implants, biomaterials and surgical equipment and techniques.

## Central Analytical Research Facility (CARF)

QUT's CARF provides specialist equipment and expert scientists to enable analytical research. Its state-of-the-art equipment and expert technologists offer transdisciplinary analytical support, including sample preparation, data collection and interpretation of results.

Capabilities include cell analysis, microscopy, histology, genomics, proteomics, molecular mass spectrometry, magnetic resonance spectroscopy, vibrational spectroscopy, X-ray analysis, element and isotopes, surface analysis, physical and mechanical properties, synchrotron science and sample preparation.

## Translational Research Institute (TRI)

TRI is a world-class medical research facility, shaping an ecosystem of 1100 people in research, industry, healthcare, support roles and service providers. TRI underpins scientific excellence and innovation for complex global health problems, including in cancer, immunology, chronic and severe diseases and neurosciences. Stakeholder partners include Queensland University of Technology (QUT), The University of Queensland (UQ), Mater Research and Queensland Health.

TRI is part of Brisbane's knowledge corridor, an anchor institution within the Boggo Road Innovation Precinct, and based on the Princess Alexandra Hospital campus. It provides a home for the Translational Science Hub for developing mRNA vaccine technology—a partnership between Sanofi, UQ, Griffith University and the Queensland Government. TRI has core facilities including microscopy, histology and pre-clinical imaging for discovery research, as well as clinical research facilities at two hospital campuses to support clinical trials. The final piece of the bench-to-bedside translation puzzle is cGMP manufacturing facility ENTRI, designed to enable industry to manufacture candidate therapeutics and vaccines for clinical trials.

## Herston Imaging Research Facility (HIRF)

HIRF is a purpose-built imaging research facility and the first in Australia to be dedicated solely to clinical research. It provides access to the latest human imaging technology, which can answer a variety of questions in research areas such as medical device development, biomechanics, patient response to therapeutics, brain connectivity, and image processing activity. It is situated on the Royal Brisbane and Women's Hospital campus, making it a site for translating research into a patient population.

# Industry partners

Our partners from industry work with us to create solutions that are impactful for society and commercially viable. Partnerships between university researchers and industry provide both parties with access to transformative ideas, advanced technologies, funding opportunities and market insights, which lead to practical, scalable solutions.

Our industry partners include:

Stryker

Zimmer Biomet

Sealy Australia

Cook Medical

Logemas Pty Ltd

Aptium.ai

Gelomics

Australian Government Defence Science and Technology Group

Kumovis GmbH

I-MED Radiology

Medtronic Australasia Pty Ltd

Queensland X-Ray

Ascension Orthopaedics

LMT Surgical Pty Ltd

Wright Medical

Surgical Specialities Pty Ltd

Materialise NV

Surgical Biofix Ltd


*Professor Tony Parker is working with Surgical Biofix Ltd to offer placental membrane allografts to Australian patients*

# Case study:

## The dream team improving sleep for everyday Australians

Associate Professor Paige Little, a global leader in spine research, has teamed up with Sealy Australia to develop biomechanics-informed guidelines for mattress design for people across the globe.

In the Westernised world, a person typically spends one-third of their life asleep, with more time spent sleeping than in any other single activity. But sleep is about quality as much as quantity—where quality means how frequently we move during the night, how long it takes us to get to sleep, and the restfulness of sleep that is achieved.

Professor Little is Research Director for the QUT-Sealy Centre for Biomechanics and Sleep Research, established in 2023 after a six-year collaboration between Sealy Australia and QUT. The centre's research informs Sealy's design of mattresses that support spinal alignment and enhance sleep quality for customers of the brand.

Using a combination of lab-based biomechanical measurements, in-home sleep quality assessments, and input from participants on how well they slept on different mattresses, the QUT-Sealy Centre has collected the largest and most detailed dataset of human participant measurements of sleep in the world. Using AI and stochastic modelling, the centre provides Sealy with an authentic human evidence base for their mattress design criteria, allowing their R&D team to more effectively evaluate their product range, both now and in the future.

Dr Little is an expert in computational modelling, imaging and applying mathematical and engineering simulation techniques to spine biomechanics. Her work provides a new understanding of how biomechanics and body alignment influence sleep quality. A mattress that keeps the spine in the same alignment as when we stand is key to good quality sleep.

*Associate Professor Paige Little is working with Sealy Australia to inform mattress design*

# Clinical partners

We collaborate with clinical partners and engage with patient consumers to ensure our research aligns with real-world healthcare needs, enabling us to jointly improve treatment quality and deliver meaningful benefits to patients. These collaborations combine valuable clinical expertise, patient perspectives and healthcare data, which help shape more effective and evidence-based solutions that are relevant to everyday clinical practice. We offer seed grants to foster clinician-researcher partnerships to tackle real-world unmet medical needs.

Our researchers partner with clinical organisations, including:

### Brisbane

Royal Brisbane and Women's Hospital
Queensland Children's Hospital
The Prince Charles Hospital
Princess Alexandra Hospital
The Wesley Hospital
Jamieson Trauma Institute
Metro North Hospital and Health Service
Metro South Hospital and Health Service

### Gold Coast

Gold Coast University Hospital

### Sydney

Royal Prince Alfred Hospital
St Vincent's Hospital

### Melbourne

Austin Hospital
Victorian Heart Hospital

### Germany

LMU Klinikum Muskuloskelettales Universitätszentrum, Munich
Charité – Universitätsmedizin Berlin

# Academic partners

We work with academic partners locally, nationally and internationally to drive innovation and impact. These collaborations reflect the high calibre of our research community and strengthen our global reach across disciplines.

Our key international academic partners include:

### United States of America

Massachusetts Institute of Technology (MIT)

### Singapore

Agency for Science, Technology and Research (A*STAR)

### Switzerland

ETH Zürich

### Germany

Max Planck Institute of Colloids and Interfaces,
PotsdamLeibniz-Institut für Polymerforschung Dresden
RWTH Aachen University

*RWTH Aachen University*

# Case study:

## Combining expertise across continents to advance treatment of patients with large-volume bone defects

Distinguished Professor Dietmar W. Hutmacher has partnered with one of Europe's largest hospitals to develop 3D-printed custom biodegradable scaffolds for bone regeneration.

Traditional options for treating large-volume bone defects caused by conditions such as trauma, infection or tumour removal include bone grafting and metal implants, which are often limited in size, carry high complication risks and can require multiple surgeries.

DProfessor Hutmacher is a world-renowned expert in bone regeneration research, whose pioneering 3D scaffolds have been used in over 140,000 patients to promote bone healing.

He has partnered with LMU Klinikum, the hospital of Ludwig Maximilian University of Munich, and Kumovis GmbH, a medical 3D printing company, to design a semi-automated software prototype for in-hospital 3D printing of scaffolds for bone regeneration.

These scaffolds—which treat fractures that are too big for the bone to self-repair—are customised to the patient's needs and biodegrade after the bone has been regenerated.

DProfessor Hutmacher's expertise is complemented by LMU Klinikum's clinical experience with orthopaedic surgeon Professor Boris Holzapfel, who did a PhD with DProfessor Hutmacher from 2014–2016. This collaboration will inform the design of a clinician-friendly interface and validate workflow and devices against large-volume bone defects. Kumovis GmbH are contributing manufacturing and regulatory expertise to ensure the patient-tailored scaffolds can be produced in hospital settings.

The partnership, supported by Queensland and Bavarian Government funding, shows how academic, clinical and industry expertise can work together to improve patient outcomes and cut healthcare costs.


*DProfessor Dietmar Hutmacher (middle) with Dr Jacqui McGovern and DProfessor Dmitri Golberg*

‘Support from the Centre for Biomedical Technologies (CBT) has shaped my career at a crucial stage. My CBT Early Career Researcher grant to develop a novel muscle wrapping model for biomechanical musculoskeletal simulations, working with Germany’s Friedrich-Alexander University, demonstrated my capacity to drive innovative, interdisciplinary projects and expanded my international research network. CBT also trusted me with leadership responsibilities, including representing early career researchers at the 2024 strategic retreat.

With this strong foundation and continued financial backing, I secured a competitive Advance Queensland Industry Research Fellowship to collaborate with medtech global leader Stryker to validate shoulder musculoskeletal models for orthopaedic and surgical applications, which should ultimately improve shoulder surgery outcomes and patients’ lives.’

**Dr Max Lavaill**
**Advance Queensland Industry Research Fellow**

# Training opportunities

We boost the capacity of the biomedical technology sector by training the next generation of talent. Our Higher Degree Research students are a vital part of our mission as they advance the knowledge of the field while developing industry-ready skills.

Our Future Leaders Committee supports early-career and higher-degree researchers, who have opportunities to share their work more broadly through presenting at our Lunch Club seminars and external conferences and events. We encourage our students through monthly awards to recognise their achievements.

We connect our students with industry through meet-ups and internships, where all parties benefit from the delivery of rapid solutions overseen by an expert academic mentor, while retaining intellectual property within your organisation.


'The QUT Centre for Biomedical Technologies has provided invaluable support throughout my PhD. With their backing, I secured a Fulbright Future Scholarship for a placement at the University of Washington, where I contributed to one of the first 3D human models of facioscapulohumeral muscular dystrophy. As part of my industry-aligned PhD, I partnered with spin-out company Gelomics, which has strengthened my passion for translating scientific discoveries into products and therapies.'

**Laura Milton**
**PhD student**

# Contact us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