Queensland life sciences

globally competitive
Talented Queenslanders are responsible for world-leading research and development, and my government is right behind them with our $180 million Advance Queensland strategy.

We are passionate about evolving ideas into reality. We realise that for innovation not only to survive but to thrive, there must be collaboration.

We welcome new investment to create new industries and new jobs in Queensland.

Honourable Annastacia Palaszczuk MP
Premier and Minister for the Arts

Cover image:
Imaging a world with 3D printing customised body tissue
Associate Professor Mia Woodruff and her team at QUT are working towards making 3D printed body parts available to everyone. Mia Woodruff’s exciting vision is of a future where a 3D printer will be in every operating theatre. This dream drives her research in tissue engineering and biofabrication. Photo courtesy of QUT. For more information ➔woodruffgroup.org
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<td>Professor Ian Frazer AC, Chair Translational Research Foundation Board, co-inventor of Gardasil® — the world’s first cervical cancer vaccine</td>
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Queensland life sciences are globally competitive. The state is a highly attractive knowledge hub with successes in health, agriculture, the environment and industrial biotechnology utilising the state’s unique biodiversity, world-class skills and infrastructure.

The Queensland Government is continuing to actively support the state’s life sciences industry through:

- investing in biotechnology research and its commercialisation
- supporting world-class research precincts and centres of excellence
- translating knowledge from key international alliances into new products and services.

The Queensland Government is fostering key international alliances to promote technology transfer, the exchange of ideas and access to skills required to advance research collaborations and development.

Queensland’s key international relationships in science and research include working at the state or national level with:
- Canada
- China
- India
- New Zealand
- the United States of America.

Queensland at a glance

- 252 companies in the life sciences industry
- 86 core biotechnology companies
- 47 biotechnology-related research institutes employing about 5871 researchers
- revenues of A$600 million for biotechnology companies and A$1.07 billion for biotechnology-related research institutes

Queensland’s advantages

Ideally positioned at the crossroads of the Asia-Pacific, Queensland has many strong advantages as an investment destination including:

- a strong, stable economy and governance institutions
- market access via free trade agreements with key trading partners including China and Japan
- an educated, highly skilled, motivated workforce with access to world-class training facilities
- the lowest payroll tax in Australia, low commercial property rentals and competitive living costs compared to other states
- a legal framework with strong intellectual property rights and patents regulations


Source: abs.gov.au/ausstats/abs@nsf/mf/5220.0

Queensland is about 2.5 times bigger than the state of Texas in the USA

Queensland’s economy is worth A$305 billion.
Building capabilities

Queensland has a strong research infrastructure platform and is investing in people, ideas and partnerships to drive creativity and innovation. The government’s A$180 million Advance Queensland initiative is invigorating research and development in the state, and growing the knowledge-based jobs of the future.

Advance Queensland is enabling the shift from ideas and research into outcomes through a number of influential programs designed to foster collaborations, knowledge transfer and translation, investments and new enterprises by:

- positioning Queensland as a global innovation hub with Innovation Partnership grants available for collaboration between Queensland research institutions and industry on research projects
- encouraging collaboration between Queensland and international innovators through the Global Partnership Awards designed to provide our outstanding researchers and entrepreneurs with the opportunity to learn directly from overseas successes
- establishing medium to long-term strategic relationships with global research or innovation programs through the International Innovation Partnerships program. This program also provides opportunities to build joint investments with leading global research institutions or universities to support collaborative R&D
- improving collaboration between Queensland universities and industry through Knowledge Transfer Partnerships to exchange skills and ideas and inspire innovation
- helping turn ideas into reality through the Business Development Fund by co-investing in Queensland businesses that are at the forefront of commercialising ground-breaking research or innovations
- attracting international and interstate talent to Queensland through Hot DesQ to boost Queensland’s startup ecosystem and broaden our global connections

- supporting the development of new or improved products, processes or services with the Ignite Ideas Fund to secure investment, launch into global markets and grow businesses
- supporting people through a range of Fellowships, including targeting research that will help advance medical research and stimulate new industries such as industrial biotechnology
- developing the pipeline of talented Queensland school students moving into science, technology, engineering and mathematics (STEM) for a skilled and innovative workforce.

In less than a year since being launched in July 2015, Advance Queensland has created the foundations to harness the economic benefits of innovation, making Queensland an attractive destination for international partnerships and collaborations.

For more information visit advance.qld.gov.au

Strategic science-related investments made under Advance Queensland so far include:

- the Queensland Emory Drug Discovery Initiative (QEDDI) for the discovery of new treatments for diseases such as cancer, diabetes and infectious diseases. It is based at The University of Queensland and is a collaboration with Emory University in Atlanta, USA
- a new Johnson & Johnson partnering office at QUT which will help to accelerate the commercialisation of Queensland and Australia’s life sciences research; and Johnson & Johnson Innovation Quick Fire Challenge, supporting the next wave of innovative Queensland health solutions
- the establishment of the TRI Innovation and Translation Centre, a new partnership between Queensland’s Translational Research Institute and Siemens Healthcare to enhance the translation of relevant research into market-ready products
- a new Commercialisation Partnership Program with the Chinese Ministry of Science and Technology to help place Queensland businesses and researchers into leading incubators across China, to develop and commercialise their emerging technology.

Queensland life sciences globally competitive
Queensland research institutes

Queensland boasts a critical mass of research centres across a range of sectors. Further details are available online by searching the Queensland science capability directory qld.gov.au/ScienceDirectory.

Queensland universities
10  Australian Catholic University
  8   Bond University
  4   Central Queensland University
 20  Griffith University
  2   James Cook University
 16  Queensland University of Technology (QUT)
 14  The University of Queensland
  5   University of Southern Queensland
  7   University of the Sunshine Coast

Biotechnology
14  Australian Institute for Bioengineering and Nanotechnology
18  BioPharmaceuticals Australia (BPA)
20  The Eskitis Institute for Drug Discovery
14  Queensland Bioscience Precinct incorporating CSIRO and Institute for Molecular Bioscience
18  Translational Research Institute (Princess Alexandra Hospital)

Food and agriculture
  1   Australian Tropical Forest Institute
  2   Australian Tropical Science and Innovation Precinct
 16  Centre for Tropical Crops and Biocommodities
  2   Cooperative Research Centre for Developing Northern Australia
 17  Ecosciences Precinct
 19  Health and Food Sciences Precinct
  3   Mackay Renewable Biocommodities Pilot Plant
  2   Northern Australia Cooperative Research Centre
 14  Queensland Alliance for Agriculture and Food Innovation
  6   Queensland Animal Science Precinct

Health and medical
  2   Australian Institute of Tropical Health and Medicine
 14  Centre for Medical Diagnostic Technologies in Queensland (MedTeQ)
 18  The University of Queensland Diamantina Institute
  9   Institute for Glycomics
 12  Institute of Health and Biomedical Innovation
 14  Institute for Molecular Bioscience
  9   Menzies Health Institute Queensland
 18  Pharmacy Australia Centre of Excellence
 13  QIMR Berghofer Medical Research Institute
 14  Queensland Brain Institute
 18  Translational Research Institute (Princess Alexandra Hospital)

Clinical trials
 14  Centre for Integrated Preclinical Drug Development, incorporating TetraQ
  9   Institute for Glycomics
 15  Mater Research
  9   Menzies Health Institute Queensland
 13  QIMR Berghofer Medical Research Institute
 11  Wesley Research Institute
Primary university campuses
Key research institutes

Queensland life sciences globally competitive
There is a continued drive for Australia to be at the forefront of advanced manufacturing. Cook’s Queensland plant is unique in that it produces custom-made medical devices which are exported to more than 60 countries. This success is attributable to our skilled local workforce who consistently produce exceptional quality devices, specific to the diverse needs of patients’ anatomies.

Barry Thomas, Cook Medical Vice President, Director–Asia Pacific, Managing Director, Cook Australia

Anteo Diagnostics

Anteo Diagnostics Ltd is a global technology company, developing and commercialising products for sale into the life science, diagnostics, medical devices, and energy markets. Based in Queensland, the Anteo Group owns patented ‘nanoglu’ or ‘nanocoating’ technologies, which are used, for example, by healthcare customers to deliver faster, cheaper or more sensitive tests.

Nanometre thin glues used to bind proteins onto synthetic surfaces for diagnostic applications also have uses in many application areas, including biomedical, health care, energy, electronics, environment, textiles, food and agriculture, and any other ‘nanotechnology’ field where small particles are used.

Next generation, high-performance lithium-ion battery materials require glues and coatings to improve capacity, achieve faster charging and increase battery cycle life. The same core technology spans both life science and industrial markets.

For more information, please visit www.anteodx.com.

Life Sciences Queensland

Life Sciences Queensland Ltd (LSQ) is an industry-led organisation, working with 170 member organisations and all levels of government to provide leadership, promotion and growth opportunities for life sciences firms and organisations. It also raises the profile of the role of life sciences, innovation and economic development.

LSQ is a key channel for building and maintaining a globally competitive sector in Australia by:

- facilitating business development of new and existing companies
- profiling members’ capabilities through national and international marketing
- developing and advocating approaches to deal with industry issues, to take advantage of new opportunities
- identifying relevant international strategic partners and networks
- strengthening access to, and linkages with, relevant science research capabilities
- hosting industry forums to bring together the life sciences sector in the Asia–Pacific region.

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Ellume—home diagnostic platform

Ellume is focused on enabling people to get better sooner by developing rapid, accurate and simple diagnostics which link them to optimum therapy.

Its technology meets the increasing need for improved rapid, accurate and simple diagnostics for common infectious diseases. The technology is a unique fluorescent nanoparticle integrated with an ultra-sensitive and low cost analyser. This approach enables Ellume to create products with category-leading accuracy to give clinicians and patients optimum information when they need it.

The first product Ellume has developed is a home test for influenza to enable people to rapidly and accurately diagnose influenza A and B within 20 minutes and provides a direct link to telemedicine services through a patented authentication system. This enables consumers to diagnose influenza themselves and access clinical support without having to leave home. This product is in the final stages of development and launch is anticipated for 2017.

In parallel Ellume is developing a smart-phone enabled diagnostic platform for use by clinicians. The product uses the same Ellume technology but allows for a variety of tests to be performed simultaneously and results to be available in three to five minutes. The first product on this platform will also be released in 2017.

BioProton—enzymes for innovative animal feed

Bioproton is an Australian-based biotechnology company developing, manufacturing and marketing high quality feed enzyme supplements.

Bioproton produces Natuzyme, an enzyme for use in feed, specifically swine, poultry, ruminant and aqua feeds to enable better nutrient utilisation and higher quality end products with lower total costs. It also provides the added benefit of decreasing the phosphorous levels in animal waste and, in turn, reducing the impact on the environment.

Founded in Finland, the company recognised that Queensland offered a better location to access the growing Asia–Pacific market. The move here in the 1990s contributed to its global success as an industrial and agricultural biotechnology company providing feed supplements. With its head office, product development and manufacturing operations based in Brisbane, Bioproton’s global marketing and distribution network now covers Africa, Asia, Europe, Russia, the Middle East, and North and South America.

BioProton continues its efforts to develop and produce enzymes with improved characteristics, by collaborating with The University of Queensland’s Australian Institute for Bioengineering and Nanotechnology.
Key infrastructure

Queensland has niche strengths in agriscience, biocommodities and tropical health. Substantial investments are developing these strengths to help new industries and foster innovation in traditional industries—positioning Queensland as an Australasian centre of excellence for science and technology.

Brisbane’s Princess Alexandra Hospital campus brings together some of Queensland’s leading institutes such as the Translational Research Institute and the Pharmacy Australia Centre of Excellence.

The Translational Research Institute represents the future of biomedical research in Australia. It provides for a complete turnkey approach of accelerating novel therapies into clinical applications for treating common and serious illnesses and diseases. This includes breast, prostate, blood, neck and skin cancers; diabetes and obesity; infectious diseases such as HIV and malaria; and bone and joint diseases such as rheumatoid arthritis.

The Royal Brisbane and Women’s Hospital campus hosts the QIMR Berghofer Medical Research Institute. This institute houses up to 600 scientists specialising in research focusing on cancer, infectious diseases, mental health and a range of complex disorders. QIMR Berghofer is a world leader in cancer immunotherapy, biomarker and target discovery, and human genetics.

Nearby is the Institute of Health and Biomedical Innovation (Queensland University of Technology), a collaborative institute working to develop global health solutions covering three broad areas—prevention, mind and body health, and recovery.

The Translational Research Institute is home to over 700 researchers and clinicians from its partner organisations including The University of Queensland; Mater Research; Queensland University of Technology; and the Princess Alexandra Hospital.

Through ground-breaking commercial partnerships such as the TRI Innovation and Translational Centre in collaboration with Siemens Healthcare, TRI is leading the way in medical research.

“...The Translational Research Institute will have a direct impact on improved public health and enhanced preventative treatments for people worldwide. The institute’s model not only aims to achieve better health for the community, but through the presence of a co-located bioparmaceutical manufacturing facility, deliver economic benefits directly back to Australia.”

Professor Carolyn Mountford
CEO and Director of Research, Translational Research Institute
Queensland is home to the only two organisations in Australia fully dedicated to the cGMP grade contract manufacture of biopharmaceutical active ingredients—**Patheon Biologics** and **LuinaBio** (formerly PharmaSynth). These Brisbane-based facilities have complementary manufacturing processes and serve as a testament to Queensland’s capabilities across the full spectrum of biopharmaceutical development. Patheon Biologics focuses on mammalian cell culture products while LuinaBio has expertise in microbial cell-derived products.

Patheon Biologics is the operator of the **BioPharmaceuticals Australia** (BPA) facility, co-located with Queensland’s new Translational Research Institute. This means biopharmaceuticals can be discovered, developed, clinically tested and manufactured in a single location.

LuinaBio (formerly PharmaSynth) has been a cornerstone of the Queensland life sciences industry for more than 20 years. Operating in Queensland’s vibrant biotech sector meant great things for our business, including access to highly qualified staff, close proximity to world-class research and strong relationships with local complementary service providers.

The **Clem Jones Centre for Neurobiology and Stem Cell Research** is part of Griffith University’s **Eskitis Institution for Drug Discovery**. It is developing therapies for the treatment of acquired brain and spinal cord injuries, including the use of compounds from natural products, and new techniques to grow cells in three dimensions and using three-dimensional bioprinting.
Key infrastructure cont’d

The **Ecosciences Precinct** brings together multiple research organisations to create a centre of excellence examining climate change, water quality, environment, natural resources and sustainable growth of agricultural industries.

The **Health and Food Sciences Precinct** is delivering leading research at the interface of health care, medicine, food and nutrition. The precinct houses research staff from the Queensland Government and **CSIRO**, and **The University of Queensland**, co-located with **Queensland Health Forensic and Scientific Services** staff.

The **Australian Institute of Tropical Health and Medicine** in conjunction with **James Cook University** is focused on providing local and global health solutions by addressing threats such as TB, dengue fever, streptococcal infections and bacterial sepsis.

The newly established **Gold Coast Health and Knowledge Precinct** is located in the heart of Australia’s emerging global city.

The 200-hectare (500 acres) precinct offers a unique global opportunity for local and international investors to locate adjacent to a research intensive university, clinically driven teaching hospital, leading private hospital and a range of prominent corporations.

A collaborative environment for mixed-use health, knowledge and commercial activities, the precinct is a vibrant community where people live, learn and work; providing a dynamic location for a diverse range of businesses to cluster and grow.

An artist’s impression of the Gold Coast Health and Knowledge Precinct
Photo courtesy GCH&KP
Opportunities for clinical trials

Why Australia?
There are significant advantages to conducting clinical trials in Australia. Non-dilutive funding and streamlined clinical trial processes provide unique support to biomedical product developers, all within a first-world regulatory environment that is 100 per cent aligned with international standards including:

- up to a 45 per cent cash refund on qualifying R&D expenditure through the R&D Tax Incentive scheme
- fast-track progression to global phase II trials under the Australian Clinical Trial Notification (CTN) scheme
- high quality data that is acceptable in North American, European and Asian jurisdictions.

Why Queensland?
The Queensland Government is committed to working with industry to enhance the competitiveness of the local clinical trial sector by:

- streamlining the ethics and governance approval processes: (i) 97 per cent of commercial clinical trials are reviewed within the 60 days ethical review window; (ii) the Interstate Mutual Acceptance Memorandum of Understanding between Queensland, New South Wales, Victoria and South Australia has been a major contributor in decreasing duplication of ethical review for clinical trials; (iii) Queensland Health is participating in a trial of new research governance review processes in order to streamline review times further
- improving recruitment and retention of patients to clinical trials in Queensland
- managing the Database of Research Activity (DoRA) which was established in 2011 and lists all research conducted in Queensland Health facilities.

Bringing together financial, manufacturing, bioanalytical, clinical and regulatory experts, Queensland is the one-stop-shop for clinical research and development:

- Patheon Biologics and LuinaBio—the industry leading biopharmaceutical contract manufacturing organisations (CMO). LuinaBio specialises in microbial cell-derived products while Patheon Biologics offers mammalian cell culture capabilities.
- TetraQ—a state government-supported contract research organisation providing a range of integrated and tailored preclinical services to the global pharmaceutical and biotechnology industries.
- Clinical Network Services (CNS)—a uniquely integrated service group providing a comprehensive range of services in strategic planning, delivery of chemistry, manufacturing and control (CMC)/non-clinical development programs and rapid initiation of clinical trials.
- Q-Pharm—a commercial phase I/II clinical trials facility, forming the cornerstone for integrated clinical research at QIMR Berghofer.
- ERA Consulting—a leading independent regulatory affairs and product development consultancy specialising in complex biotechnology-related medicines, and assisting with preclinical services and CMC, and clinical trial design and applications.

The Queensland Clinical Trials Network Inc., via Life Sciences Queensland, assists developers of human therapeutics and devices to distribute pre-clinical and clinical research to the network’s ‘best-of-breed’ cluster of service providers.

BioPharmaceuticals Australia (BPA) is a niche industry development organisation focusing on the biopharmaceutical sector. BPA strives to support the development of therapeutics from the preclinical stage right through to approved products.

In 2014, BPA launched the Biopharmaceutical Development Fund (BDF) aimed at early stage researchers and commercial drug developers, providing access to its state-of-the-art mammalian cell culture infrastructure.
Opportunities for clinical trials cont’d

Funding is also available for international companies wanting to establish local subsidiaries to benefit from Australia’s R&D Tax Incentive and the CTN scheme.

Recent grant recipients include:
- Paranta Biosciences Limited is undertaking the clinical development of its lead drug targeting cystic fibrosis lung disease. First-in-human phase 1 clinical trials are underway and already showing promise.
- US company ZZ Biotech LLC established a subsidiary in Australia for the clinical development of its unique biotech therapies. Its lead product for neuroprotective and anti-inflammatory activities is now showing promise in the treatment of acute ischemic stroke.

For more funding rounds visit biopharmaus.com.au.

Therapeutic Innovation Australia (TIA) provides access to coordinated and integrated national translational health pathways for researchers developing small molecule pharmaceuticals, biopharmaceuticals, devices, biomarkers and cell based therapies. Participating Queensland capabilities include:
- The University of Queensland’s:
  - Centre for Integrated Preclinical Drug Development (CIPDD) and TetraQ
  - PET/μCT facility of the UQ Diamantina Institute (UQDI) Centre for Clinical Diagnostics (CCD) of the UQ Centre for Clinical Research (UQCCR)
  - National Biologics Facility (AIBN)
  - Centre for Clinical Diagnostics (CCD) of the UQ Centre for Clinical Research (UQCCR)
- QUT’s Genomics Research Centre (GRC) at the Institute of Health and Biomedical Innovation (IHBI)
- QIMR Berghofer Medical Research Institute, Clinical Trials and Biostatistics Unit (CTBU)
- Griffith University’s Compounds Australia

TIA manages the Australian Therapeutic Pipeline and supports the development of quality facilities through providing subsidised access to quality documents (www.iqdocs.org). TIA is supported through the National Collaborative Research Infrastructure Strategy (NCRIS).

QIMR Berghofer

Translating discoveries into health solutions

QIMR Berghofer is a world-leading translational research institute focused on cancer, infectious diseases, mental health and complex disorders.

Pipeline for innovation to commercialisation

QIMR Berghofer has an established pipeline of innovative projects developed by researchers, and supported by in-house resources including an experienced business development team and proof-of-concept program. The latest translational initiative, the Institute’s SEEDBox®—Science Exploitation and Entrepreneurial Development program—is accelerating the translation of the world-class research into a pipeline of high-value projects with potential for new treatments in areas such as cancer and infectious diseases.
This pipeline has resulted in QIMR Berghofer entering into strategic collaborations with commercial partners for the development of therapies up to and including clinical development.

For example:

- Bristol Myers Squibb—a collaborative research and licensing partnership for the discovery and development of novel therapeutic antibodies in immuno-oncology
- Atara Biotherapeutics—worldwide licence and research agreement to develop and commercialise allogeneic T-cell therapies for potential application in the treatment of various cancers and certain autoimmune disorders
- Medicines Malaria Ventures (MMV)—strategic clinical development collaboration using QIMR Berghofer’s malaria challenge model. MMV funds malaria challenge clinical trials on pipeline projects.

Unique integrated clinical research platform

QIMR Berghofer has developed an approach that seamlessly combines both preclinical and clinical trials via the combination key in-house services:

- **Q-Pharm**—a commercial phase I/II clinical trials facility, wholly owned by QIMR Berghofer and forming the cornerstone for integrated clinical research. Since its inception in 2002, Q-Pharm has been involved in more than 350 clinical trials and conducts about 30 clinical studies each year. The facilities include a recruitment and outpatients clinic; specialised 18-bed clinic; open-plan 24-bed facility; data management and quality assurance units; and PC2 laboratory
- **Q-Gen cell Therapeutics**—a TGA approved facility to manage GMP manufacturing of cellular therapies.
- **Clinical Trials and Biostatistics Unit**—enhances clinical capabilities by providing the infrastructure and expertise to conduct early and late phase clinical trials strictly following the regulatory guidelines (Food and Drug Administration) and biopharmaceutical industry standards.
Invest with us

Queensland is the ideal investment location, with a stable economy, low business operating costs, a highly skilled workforce, great lifestyle and strategic Asia–Pacific location.

Over the past decade, the Queensland Government has made significant investments in science and technology that have provided an enduring legacy.

Our critical mass of knowledge hubs has strengthened the state’s global competitiveness and attracted significant support and investment from international researchers and businesses.

We are actively encouraging more investments and new enterprises between Queensland and the world through Advance Queensland initiatives: the Business Development Fund, which is helping turn ideas into reality; and supporting the development of new or improved products, processes or services with the Ignite Ideas Fund.

The pipeline of new Queensland technologies continues to expand, offering a variety of collaborative and commercial opportunities.

Vaxxas Nanopatch™

The Nanopatch™ is a vaccine delivery technology that uses thousands of microscopic projections to deliver vaccines directly to dense populations of immune cells just below the surface of the skin.

Application of the Nanopatch™ avoids nerve endings that cause pain, and in model systems has been shown to enhance immune response, using as little as one hundredth of the dose typically needed for the traditional needle and syringe.

The patented Nanopatch™ was developed at The University of Queensland and licensed to Vaxxas Pty Ltd by UniQuest.

In 2015 Vaxxas was successful in securing A$27 million in equity funding, led by Australian venture capital firm OneVentures, to advance a series of clinical programs and develop a pipeline of new vaccine products for major diseases. This new round of financing brings the total capital raised by Vaxxas to A$40 million.

HealthCare Ventures and the companies it manages seek new investments and conduct drug development activities globally. We have been active in Queensland—investing in Vaxxas and its Nanopatch™ vaccine delivery technology, manufacturing clinical trial material of our monoclonal antibody products, and conducting clinical trials—because of its world-class research, knowledge-based industries, and supportive environment. The vibrancy and breadth of the Queensland life sciences community creates a great place for innovative business.

Mr Doug Onsi
Managing Director, HealthCare Ventures
United States of America

Applying vaccines using Nanopatch™ and (inset) electron microscope view of the close up of micro needles
Photos courtesy Vaxxas
The Queensland life sciences industry employs over 14,000 people, invests A$650 million in research and development, and has an estimated combined income of A$4.4 billion. With dynamic institutes, access to an impressive research and skills pool, world-class infrastructure and substantial funding and support for research and job creation through the state government’s Advance Queensland program, Queensland counts when it comes to life sciences.

Dr Geoff Garrett AO
Queensland Chief Scientist
Investment opportunities

Queensland has world-class infrastructure that supports a vibrant and growing scientific community, with a number of demonstrated commercial successes, including the GARDASIL® vaccine. There are many breakthrough technologies ready for investment which are being developed by Queensland researchers.

**Griffith Enterprise** (Griffith University), **qutbluebox** (Queensland University of Technology), **UniQuest** (The University of Queensland), **University of Southern Queensland**, **James Cook University** and the **QIMR Berghofer Medical Research Institute** are all working to take local research to the global market.

Visit the Queensland Science website [qld.gov.au/InvestInScience](http://qld.gov.au/InvestInScience) to learn more about these investment opportunities.

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**PlasProtecT®—whole parasite malaria vaccine**

PlasProtecT® is a chemically attenuated, whole parasite, blood stage malaria vaccine candidate which has a demonstrated ability to elicit cross-strain and cross-species protective immune response in rodent models. It has also been demonstrated to be immunogenic in first-in-man clinical studies.

*Griffith University’s Institute for Glycomics is seeking partners to co-develop or sponsor the clinical development of PlasProtecT®.*

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**Asthma therapeutics**

Dr Manuel Ferreira at QIMR Berghofer, and Dr Simon Phipps from The University of Queensland, have identified two G-protein-coupled receptor (GPCR) targets associated with obesity-related asthma. The two related GPCRs were identified through genome-wide association studies and have been validated through detailed molecular biology and through the use of existing modulators.

*QIMR Berghofer is seeking investors interested in pursuing the development of therapeutics for asthma. The investment would be used to further develop novel small molecules and antibodies to the targets.*

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**Peptide inhibitor discovery platform**

Griffith University has developed a bioinformatics platform for the discovery of peptide inhibitors with application to the discovery of new classes of antimicrobial, antiviral and anticancer drugs. Combining the advantages of small molecule drugs and biological drugs, proof of concept studies demonstrated greater than 50 per cent success rate in the discovery of antibiotics with micromolar activity.

*Griffith University’s Institute for Glycomics is seeking investment for the development of a pipeline of new classes of antimicrobial, antiviral and anticancer drugs.*

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**Parainfluenza small molecule inhibitors**

Griffith University has developed potent new small molecule inhibitors of human parainfluenza virus (hPIV) haemagglutinin–neuraminidase (HN). These first-in-class small molecule antiviral compounds potentially address the unmet need for treatment of hPIV infections and are an order of magnitude more active than any other published hPIV HN inhibitors.

*Griffith University’s Institute for Glycomics is seeking investment to support a commercially focused lead optimisation and preclinical development program.*
**Prostate cancer diagnostic**

QUT researchers have identified a panel of genes that can be detected in prostate cancer to determine which patients are likely to suffer from more aggressive metastatic disease. Patients who are likely to have a better outcome can be spared more aggressive therapies.

*qutbluebox seeks an industry partner to license the technology and undertake further validation of the diagnostic test prior to commercial launch.*

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**Infectious disease treatments**

The University of Queensland (UQ) has specific partnering opportunities in a number of small- and large-molecule (macrocycle) projects against gram positive and negative bacteria, including:

- **furthering the development of lead candidates called ‘vancapticins’** which are selectively targeting gram-positive bacterial membranes in preference to mammalian cell membranes by concentrating the antibiotic at the site of the target. The vancapticins have 20- to 100-fold more potency than vancomycin or daptomycin against MRSA and enterococci, and maintain significantly better activity against vancomycin-resistant strains (VISA, VRS and VRE).

- **restoring sensitivity of carbapenem-resistant enterobacteriaceae (CRE) to the carbapenem antibiotics on the market** using compounds identified by UQ researchers. These compounds have the potential to prolong or restore the activity of carbapenem antibiotics and address the urgent threat of CRE.

The University of Queensland also offers an **antimicrobial screening service** for academic research groups through the Wellcome Trust funded Community for Open Antimicrobial Drug Discovery (CO-ADD). More information [www.co-add.org](http://www.co-add.org).

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**Reducing brain damage post-stroke**

A neuroprotective therapeutic has been developed for application in the treatment of brain injury following a stroke, to prolong the window of opportunity past the current four hours. The agent is a peptide-based inhibitor.

When administered as a single dose more than four hours after stroke in a rodent model, the candidate demonstrates a significant reduction in infarct size and improvement in motor coordination and neurological score.

*The University of Queensland is seeking an investment or licensing partner.*

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**Novel therapeutic to accelerate wound healing**

Chronic wounds, such as diabetic ulcers, contribute to high mortality rates and significant expense in the health system. A putative growth factor, isolated by James Cook University researchers, shows great promise in accelerating wound healing in punch-biopsy animal models.

A head-to-head comparative study with the only FDA-approved therapeutic for diabetic ulcers showed a significant acceleration of wound closure for the novel therapeutic.

*James Cook University is seeking to partner with biotechnology or pharmaceutical companies to collaboratively develop this biologic into a ‘best in class’ therapeutic for chronic wounds and surgical applications.*

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Collaborate with us

Queensland recognises the importance of partnering with leading international experts across all life sciences to access cutting-edge technology, intellectual know-how and new markets. The state works in partnership with many of the world’s established and emerging knowledge powers including Canada, China, India, the United Kingdom, and the United States of America.

The Queensland Government is encouraging new collaborations between Queensland and the world through the International Innovation Partnerships, the Innovation Partnership grants, and the Global Partnership Awards.

To find out more visit advance.qld.gov.au.

Biofutures

The global biorefinery products market reached almost US$438 billion in 2014 and the sector is expected to reach US$1,128 billion by 2022 (World Economic Forum, 2014). Queensland is well positioned to contribute to this market with its tropical and sub-tropical climate, significant biomass availability, a technologically advanced agricultural sector and world-class research capability in its universities and industry.

The Queensland Government’s Advance Queensland biofutures 10-year roadmap and action plan seeks to harness these strengths to establish a new industrial biotechnology and bioproducts sector in the state over the next decade.

To help Queensland transition to a clean energy economy, grow our biofuels and biomanufacturing sectors and boost jobs across the industry, the Queensland Government introduced a biofuels mandate and funding for an advanced biofuels pilot plant to be built at Southern Oil Refining’s Yarwun plant at Gladstone.

The Queensland Government’s broader vision is for a A$1 billion dollar sustainable and export-oriented industrial biotechnology and bioproducts sector attracting significant international investment, and creating regional, high-value and knowledge-intensive jobs.

A range of Queensland universities and institutes are providing leading R&D on advanced biofuels, biochemicals, bioplastics, techno-economic modelling, integrated supply chain logistics, emerging specialised energy crops and high yield cultivars, and germplasm improvement including: The University of Queensland, James Cook University, and the Queensland University of Technology.

These research groups have key partnerships with global companies such as Dow (USA), Syngenta (Switzerland), Novozymes (Denmark), Asahi (Japan), Pacific Northwest National Laboratory (USA), Joint BioEnergy Institute (USA), Clemson University (USA), and Bioindustrial Innovation Canada.
Clinical trials

Patheon Biologics and BioPharmaceuticals Australia are collaborating with the research facilities and expertise available at The University of Queensland’s (UQ) Australian Institute for Bioengineering and Nanotechnology (AIBN) for the development of mammalian cell lines.

Through the partnership between Patheon Biologics, BioPharmaceuticals Australia, and AIBN’s National Biologics Facility, Australia now has the capability to span the chasm between the fundamental discovery of potential biopharmaceuticals and biologics, and the ability to prepare clinical grade material for human trials and subsequent commercial manufacture.

Already, this partnership has produced benefits for a number of Australian and international companies that are now having clinical grade material manufactured in Brisbane. AIBN and its clinical collaborators have just successfully completed a phase 1 clinical trial on a monoclonal antibody active against the deadly Hendra virus.

Global solutions for food security

Queensland is committed to boosting scientific partnerships to support the state’s economy, and one of the key industries is agriculture. The Queensland Government is investing in agricultural research programs—ranging from beef probiotics, controlling livestock parasites to improving food productivity and nutritional security. There are also important partnerships in agricultural research programs, particularly in the cultivation and processing of raw materials.

Despite recent technological advances including improved varieties and irrigation systems, changing climatic conditions remain a dictating factor affecting agricultural productivity and impacting on food security globally.

The researchers at QUT are developing drought-tolerant and disease-resistant varieties of chickpea that are set to put Queensland at the forefront of Australia’s pulse exports.

The Centre for Tropical Crops and Biocommodities is using biotechnology to genetically engineer chickpea varieties capable of withstanding Australia’s harsh climate. Pulses are an important source of protein.

As the world’s population increases, its dependence on animal protein is not sustainable, which leaves chickpeas to fill the gap. The centre’s Director Professor Sagadevan Mundree said the research would enable existing farmers to use marginal land to expand into chickpea and other tropical pulse production. Queensland has an opportunity to develop this industry and reap the rewards in the future.
The Queensland Alliance for Agriculture and Food Innovation (QAAFI) is a unique Australian research institute bringing together scientific experts from the Queensland Government Department of Agriculture and Fisheries (DAF) and UQ. QAAFI has accumulated significant industry income, reaching $100m in external funding during 2014 and is expected to surpass the $200m goal of external funding in its sixth year, 2016. The institute will continue to collaborate with over 150 commercial companies.

After its first five years of operation, QAAFI is living up to the vision of becoming a world-leading agricultural research institute and internationally recognised centre for agriculture and food research in the tropics and subtropics.

QUT is leading a major international project funded by the Bill and Melinda Gates Foundation to create bananas with high levels of pro-vitamin A to alleviate the continuing burden of micronutrient deficiencies in Africa and Asia, and also with resistance to banana bunchy top virus.

The project partners include the National Agricultural Research Organisation of Uganda, the International Institute for Tropical Agriculture, the Malawi Department of Agricultural Research Services and five institutions in India. After successful field trials in Queensland, the biofortification project has now moved into the development phase with new field trials in Uganda. Iron biofortification is the next target and potentially high iron lines are already in the field in Australia. The virus resistance field trial will commence in Malawi in mid-2016. Ultimately biofortification will be combined with disease resistance in bananas.

The Bill and Melinda Gates Foundation
Queensland researchers are improving the health of people living in the tropical world through funding from the Bill and Melinda Gates Foundation.

The University of Queensland, QUT and Griffith University have received significant funding from the foundation to progress research in malaria, public health management and nutrition.

With funding from the Bill and Melinda Gates Foundation, Queensland researchers are tackling banana bunchy disease which is threatening banana crops worldwide. Photo courtesy QAAFI

Professor Robert Henry, Director Queensland Alliance for Agriculture and Food Innovation The University of Queensland
The majority of QAAFI’s scientists are located and conducting research within regional Queensland and Australia. QAAFI’s locations in Australia are at an advantage as their climatic conditions are comparable to the world’s expanding tropical and subtropical environments. The remainder of QAAFI’s research team is logistically scattered throughout the major tropical and subtropical areas. The institute’s research has provided achievable solutions to world challenges. In particular, QAAFI’s research addresses the expansion of tropical and subtropical geographies and the matter of assuring global food security for their growing populations. QAAFI research has a strong focus and research application to agricultural and food science developments within India, China, Africa, the USA, Canada, Europe and Brazil.

Some examples of QAAFI’s achievements include:

- **QAAFI and DAF have developed and licensed a new sweet corn variety that contains ten times the amount of zeaxanthin than occurs naturally. High zeaxanthin protects against age-related macular degeneration.**

- **The QAAFI–DAF sorghum breeding program supports a $432 million Queensland sorghum industry that now contributes germplasm to 100 per cent of the commercial hybrid seeds planted each year in Australia. The industry has achieved a four per cent improvement yield/ha per annum since 1990. With support from the Bill and Melinda Gates Foundation this expertise is also assisting sorghum breeding programs in Africa. Sorghum feeds 500 million people in the subtropical and tropical regions of the world.**

- **QAAFI researchers have worked with Biosecurity Queensland to diagnose and help manage the Panama Race-4 outbreak that has threatened the $584 million Queensland banana industry. If the disease is contained in Australia it will be the first time in the world that this devastating disease has been achieved.**
Collaboration opportunities

Collaborations with Queensland researchers provide organisations and research institutes with access to world-class knowledge and modern research infrastructure to develop new initiatives and technologies that provide global solutions.

Visit the Queensland Science website qld.gov.au/InvestInScience to learn more about collaboration opportunities.

QEDDI—translating research into new medicines

The Queensland Emory Drug Discovery Initiative (QEDDI) is a dedicated small molecule drug discovery and development capability for the discovery of new treatments for diseases including cancer, diabetes, inflammatory disorders, and neurodegenerative and infectious diseases.

Based at The University of Queensland (UQ) in collaboration with Emory University in Atlanta, it will have core capabilities in medicinal chemistry, compound screening and project management, combined with experts recruited from industry. The aim is to translate UQ’s most innovative biological research in concert with industry expertise resulting in clinical development and commercialisation.

Unique licensing and investment opportunities will be on offer through UniQuest, for a pipeline of novel therapeutic, validated and de-risked drug leads.

QEDDI was established by UQ in 2015 in collaboration with Emory University, and is supported by the Queensland Government through the Advance Queensland initiative.
Reversing obesity-related disorders

University of Southern Queensland researchers have developed a preclinical model of diet-induced obesity, hypertension and fatty liver. Studies using this model have shown the signs of metabolic syndrome can be reversed by several food-derived compounds. Some previous studies include testing anthocyanins from purple carrots, rutin from onions and omega-3 fatty acids from chia seeds.

University of Southern Queensland is seeking industry and research collaboration to further the research.

Obesity and other non-communicable diseases are estimated to cause more than 60 per cent of all global deaths each year—making them the world’s biggest killers. With obesity rates rapidly increasing and creating significant strain on healthcare systems, it is important to develop new treatments for this and other obesity-related disorders.

Compounds Australia—access to Australia’s unique chemistry

This sophisticated compound management facility securely stores and curates sample libraries submitted by Australia’s research chemists. Compounds Australia (CA) enables new collaborations between chemists and biologists by providing: unique chemistry—synthetic and natural product chemistry; and low-cost flexible screening and assay formats. CA also facilitates interactions between global life sciences researchers and key organisations (including CSIRO, Medicines for Malaria Venture, and Australian Institute of Marine Science).

Compounds Australia (Griffith University) is seeking new international research organisations to access its open library, catalysing international chemistry research linkages.

It also seeks compound libraries from Australia’s world-class chemistry researchers—Compounds Australia can make your compounds accessible to global collaborators.

Open-access antimicrobial screening program

Community for Open Antimicrobial Drug Discovery (CO-ADD) is helping chemists discover new antibiotics to fight drug-resistant infections. A not-for-profit initiative led by academics at The University of Queensland, it aims is to help researchers worldwide find new, diverse compounds to combat drug-resistant infections.

Could you have the next antibiotic? If you are an academic research group, contact CO-ADD to screen compounds for antimicrobial activity. For free. ☏️www.co-add.org
Collaboration opportunities cont’d

**Complex and acute pain management**

The University of Queensland is developing molecules of various modalities (peptides, small molecules and natural products) against various targets in chronic and acute pain. One particular example is using its expertise in peptide chemistry and ion channel pharmacology to develop novel peptides isolated from insect venoms that can selectively block ion channel targets that have been shown to be important in the treatment of pain. Analogues of these peptides are progressing through further optimisation.

*The University of Queensland is seeking to progress these candidates through development in partnership with companies working in similar areas.*

**Nature Bank—healing from nature**

Nature Bank is established as a natural product drug discovery resource along Pharma industry lines. It offers 200,000 pre-fractionated extracts in ready-to-screen plates.

*Opportunities for investment or collaboration exist to access Nature Bank to find the next cure from nature.*

**Olfactory cells for spinal cord repair**

Improved effectiveness of the olfactory cells in repair of the spinal cord is leading to a phase I/IIa clinical trial of patients. Improvements in three dimensional growth of cells has come from using new engineering approaches combined with improved cell growth using newly discovered natural products which stimulate the cells.

A glial bridge made of olfactory cells will be transplanted into patients with contusion spinal cord injury followed by intensive physiotherapy for 12 months.

*Investment and collaboration opportunities exist with Griffith University to help support the clinical trial.*
Delayed release booster shot for animal health

Vaccinating livestock requires animal capture to deliver a prime vaccination with a booster shot usually requiring later recapture at significant cost. QUT researchers are developing a vaccine implant for stock animals that would allow a booster shot to be administered at the same time as the initial vaccination, saving significant time and money for farmers. There is no product like this available on the market.

qutbluebox is seeking an investment and development partner to assist in the formation of a start-up company to further develop the technology. The new implant technology is inexpensive and could provide farmers with a significant cost and time saving and allow premium pricing on the vaccines delivered using this device.

Personalised companion diagnostic signatures for cancer

QIMR Berghofer has developed a platform technology that can provide a biological profile of cancers at different stages of development.

This platform can identify unique signatures or profiles from specific tumours which can indicate the likely response of the tumour to an investigational drug. In addition, the platform may provide insights into new cancer indications where the drug may be also effective.

QIMR Berghofer is seeking collaborative partners with clinical oncology programs where the partner is able to share patient material to generate the drug-specific profile. On the basis of this profile, QIMR Berghofer can predict response and investigate additional indications.

Large-scale immuno-oncology collaboration

QIMR Berghofer is seeking to establish a broad collaboration in the field of immuno-oncology (I-O). This collaboration will exploit the institute’s world-leading expertise in immunology and oncology to investigate tomorrows’ I-O questions. The partner can select five to six research programs that address key industry issues, providing a strong basis for future I-O therapeutics.

Each project has been specifically developed for this initiative and is designed to offer new insights into pathways, access to novel models and interpretation, and development of novel therapeutic agents. Each project will involve two to four researchers per year over a two- to three-year period.

QIMR Berghofer Medical Research Institute is seeking partners interested in a large-scale immuno-oncology collaboration.

For more Queensland collaboration opportunities visit ➤qld.gov.au/InvestInScience

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