

Queensland, Australia



# THE ACRF INTERNATIONAL CENTRE FOR CANCER GLYCOMICS (I2CG)

Translating the human cancer glycome - new advances in diagnosing, treating and preventing cancer.

All human cells are extensively decorated with a range of complex sugar moieties (glycans), which form the host cell glycome.

These glycans are utilised as receptors for a variety of carbohydrate-recognising proteins, and the inter-cellular interactions between glycans and proteins play an essential role in how cells communicate with each other and their environment.

Not surprisingly, they also play critical roles in maintaining health and in the pathogenesis of disease, including cancers.

Yet, the language of glycan interactions remains poorly understood, particularly when compared to our knowledge of the genome and proteome.

The technology required to sequence the glycome for human clinical tissue has only recently been developed, and the Institute for Glycomics is pioneering this field.

Extensive investment into the understanding of cancer genomics and proteomics has led to tremendous advances in cancer care. Despite this, biomarkers for many cancers remain unidentified following proteomic and genomic analyses, suggesting critical knowledge is missing.

An increasing body of literature indicates that the cancer glycome is of equal importance to understanding disease pathogenesis as the genome and proteome. The glycome represents an underexploited aspect of cancer research, and holds the key to diagnosing, treating and preventing cancers.

#### **Our Vision**

Close collaboration between clinical and translational research scientists is the key to success for any patient-oriented research. The ACRF International Centre for Cancer Glycomics (I2CG) is a unique hub of exciting and revolutionary cancer glycomics research, where world-renowned experts in both the fields of basic science and clinical research combine resources, utilising state-of-the-art equipment and advanced technologies to decipher the changes to the glyco-code that occur in cancer. Understanding the cancer glyco-code, which plays a major role in tumour development and progression, will lead to the translation and development of next generation precision diagnostics and therapies to fight cancer, a devastating disease that claims the lives of over nine million people globally each year. To deep mine the cancer glyco-code, advanced technologies are essential.

The I2CG meets this technology need, making it unique in Australia and a world-leading facility in cancer glycomics research. Advanced mass spectrometry equipment forms the centrepiece of the I2CG and complements the existing resources and capabilities within the facility, enabling the brightest scientific minds in cancer glycomics research to deep mine the cancer glyco-code down to a single cell level.

The goal of the I2CG is to identify the glyco-language in these states in serum, tissue biopsies and *in vivo* in a clinical scanner of patients at high risk for cancer as well as those with a malignancy.

The team of glycomics experts work with surgeons, radiologists, scientists, and high-risk cancer clinics to develop early markers in high-risk cohorts and therapeutics based on inhibition of the pertinent glycoconjugates.

This unique facility, with its diverse and multi-disciplinary team of researchers, underpins the opportunity to better understand the glyco-code. This understanding will lead to the translation of novel discoveries into clinical outcomes that will improve the lives of countless cancer sufferers around the world.

### **Clinical Applications**

The I2CG team's extensive expertise in analytical glycoproteomics affords a research program focusing on the following clinical applications:

- **Diagnostic tools** Glycans as novel diagnostic and prognostic disease markers
- Therapeutic potential TACA identification and translation to develop monoclonal antibodies and other drug candidate technologies
- **Precision medicine** Development of specific and targeted medicines based on cancer glycan signatures
- Advanced imaging Micro-section glycomics from histopathological tissue slides to bridge histopathology and molecular imaging
- **Clinical analytics** Development of rapid bedside diagnostic tools using focused glycomics and glycoproteomics.

# The I2CG Team

- **Professor Mark von Itzstein AO** is widely recognised as a world leader in antiviral drug discovery, glycobiology and glycochemistry. He led the discovery of the world's first influenza drug Zanamivir, now marketed by GSK with sales reaching US\$1.1 billion per annum.
- **Professor Nicolle Packer** has had a distinguished career in both industry and academia. She is author of over 200 papers, inventor on numerous patents and co-founder of a successful biotech company.
- Associate Professor Daniel Kolarich is an author on nearly 100 papers in the fields of glycobiology and glycoproteomics. He led the innovative Glycoproteomics Group at the prestigious Max Planck Institute, Germany.
- Dr Arun Everest-Dass is an internationally recognised expert in structural glycochemistry, glycobiology and massspectrometry. He is one of very few researchers in Australia specialising in mass spectometry imaging with a glycomics focus.
- **Professor Michael Jennings** is internationally recognised leader in infectious diseases research with a focus on glycoscience, genetics, epigenetics and vaccine development.
- **Professor Carolyn Mountford** is a world leader in the development of magnetic resonance (MR) technology to address unmet clinical needs. Her translational research centres on MR technology for preoperative diagnosis of ovarian lesions and for breast, the capacity to determine how far the breast tissue of a woman at high risk for breast cancer has deviated.

# Our clinical, medical and research collaborators

- Peter MacCallum Cancer Research Centre
- Mater Research
- Princess Alexandra Hospital
- Queensland University of Technology
- The University of Queensland
- University of New South Wales
- Microbiome Research Centre
- Translational Research Institute
- The Australian Prostate Cancer BioResource
- Gold Coast Melanoma Clinic
- Fundacion Perez Scremini
- iCAIR Fraunhofer International Consortium for Anti-Infective Research

### About us

The Institute for Glycomics is a flagship biomedical research institute based at Griffith University's Gold Coast campus in Queensland, Australia.

The Institute is one of only a handful of its kind in the world with a focus on 'glyco'. Our vision is to be a world leader in the discovery and development of drugs, vaccines and diagnostics through the application of innovative, multidisciplinary science.

We have a strong track record in commercialisation and industry engagement, and our research leaders and business personnel have extensive experience in developing technologies for the commercial market.

With over 200 multidisciplinary researchers and support staff, the Institute for Glycomics is well positioned to deliver tangible clinical solutions for infectious diseases, cancer and neurological disorders.

## A Call to Philanthropic Partners

Philanthropic support plays a critical role in advancing scientific research by providing the necessary resources to accelerate discoveries and progress novel concepts. With funding from philanthropists, researchers are able to explore new and innovative ideas that might not be possible through traditional funding sources. This support enables scientists to take risks and pursue high-risk, high-reward research that has the potential to significantly impact our understanding of the world around us.

In addition to supporting innovative research, philanthropic funding also helps to position these discoveries for commercialization and translation from the lab to the marketplace. By partnering with industry leaders, researchers can transform their discoveries into products and services that have a meaningful impact on people's lives. This not only benefits society as a whole, but also generates revenue that can be reinvested in further research.

Without philanthropic support, many promising ideas may never see the light of day. By investing in scientific research, philanthropists are contributing to the advancement of knowledge and progress, helping to solve some of the world's most pressing challenges. With continued support, we can accelerate the pace of discovery and bring novel concepts to fruition, ultimately improving the quality of life for people around the globe.

### Contact us

Institute for Glycomics | Griffith University Gold Coast campus | Parklands Drive, Southport Queensland 4215 P +61 (0)7 5552 8051 | F +61 (0)7 5552 8098 | E glycomicsbusiness@griffith.edu.au