



The Australian Cancer Research Foundation (ACRF) Detector

How do the Australian Cancer Research Foundation (ACRF) and the Australian Synchrotron work together to fight cancer?

The Australian Cancer Research Foundation (ACRF) is dedicated to helping discover treatments and cures for cancer by funding world-class research in Australia.

The Micro Crystallography (MX2) beamline at the Australian Synchrotron stands at the frontline of efforts to understand the causes of cancer and to create new therapeutics and diagnostics. Currently around 60 per cent of all research enabled by the MX2 beamline is dedicated to cancer research.

Harnessing brilliant synchrotron light, the MX2 beamline enables researchers to investigate the arrangement and activity of molecules involved in cancer at a level of detail, speed and accuracy, that is currently not possible at any other Australian research facility.

Through a \$2 million grant from the Australian Cancer Research Foundation, the new ACRF Detector will deliver a significant increase in capacity to the MX2 beamline; accelerating the development of potential treatments for people with cancer.



The new Australian Cancer Research Foundation (ACRF) detector on the MX2 beamline at the Australian Synchrotron.

What is the new ACRF Detector?

The ACRF Detector is similar to a turbocharged camera, taking images of samples on the MX2 beamline in greater detail and in just a fraction of the time taken using a standard detector.

How will the new ACRF Detector improve data collection on the MX2 beamline?

The new detector will reduce the time in which a data-set is collected from 7.2 minutes to 30 seconds (14 times more than the current rate), enabling greater throughput of important research.



Data-set collection times will be greatly reduced

State-of-the-art hybrid photon counting detectors will enable the analysis of much greater numbers of micron-sized protein crystals, meaning projects that were previously scientifically and logistically unfeasible will become possible.

Why is it important to analyse proteins?

Proteins do most of the work in cells and are required for the structure, function, and regulation of the body's tissues and organs. In determining protein structures, we can better understand biological processes and design new medicines to fight disease.

What does the ACRF Detector mean for cancer research in Australia?

Australians with cancer will be the first to benefit as novel treatments move from laboratories into clinical trials faster than currently possible, thanks to the ACRF Detector.

The increase in speed, accuracy and quality of data from the ACRF Detector can be compared to shifting from dial-up internet to high-speed broadband; meaning more Australian researchers will gain answers much sooner, shortening the time from laboratory research to clinical testing of new cancer drugs.

What are some recent examples of cancer-related research at the Australian Synchrotron?

The Australian Synchrotron has already played a vital role in facilitating cancer-related research. Past projects include from the MX2 beamline include:

The development of the drug Venclexta™ (i.e. Venetoclax), recently granted approval by the Therapeutic Goods Administration, which is capable of 'melting away' chronic lymphocytic leukaemia.



A new approach to the treatment of Acute Myeloid Leukaemia (AML), revealed by a study demonstrating how a therapeutic antibody binds to AML cells, targeting them for destruction.

An investigation of the molecular structure and activity of perforin. This protein is released by the immune system to destroy virally infected or cancerous cells but can lead to a 30% mortality rate of leukaemia patients receiving bone marrow transplants.



How important is cancer research?

In 2012, cancer overtook heart disease as the leading, global cause of death. Cancer is not one disease, but a group of around 200 complex diseases with different, but related, causes, prognoses, treatments and patient needs.

Equally complex cancer research efforts are required to ensure every person with cancer has access to the best therapies and care tailored to their specific disease.

What is ACRF?

ACRF is a key contributor to Australian cancer research, awarding more than \$129.2 million in grants to institutes across the country since its inception 33 years ago. ACRF is dedicated to funding research in Australia that has the power to make significant breakthroughs in cancer diagnosis and treatment and will continue to fund cutting-edge treatment until cancer no longer poses a threat to the health of Australians.

What is the Australian Synchrotron?

The Australian Synchrotron is landmark national scientific infrastructure owned and operated by the Australian Nuclear Science and Technology Organisation (ANSTO).

The Australian Synchrotron is a particle accelerator; it has 10 experimental stations known as beamlines. Each beamline harnesses light that is one million times brighter than the sun to examine the structure and function of samples in unprecedented detail and unrivalled accuracy. It reveals to researchers how matter fits together, moves, interacts and changes.

The Australian Synchrotron produces light one million times brighter than the sun.

Each beamline uses detectors, which are like highly specialised cameras, characterising a diverse range of samples from proteins to paintings, advanced materials and agricultural samples.