Cancer Program

Cancer affects 1 in 2 Australians during their lifetime and causes the highest burden of disease in Australia.

Although survival rates are improving thanks to advances in medical research, QIMR Berghofer’s researchers are finding ways to improve diagnostic tools and find better, more effective treatments.

What is cancer?

The cells in our body are constantly under assault from various things like sunlight, which can damage the cell’s DNA. Usually, any damage or errors can be corrected or repaired by the body, or if it cannot be repaired, the cell will kill itself, or our immune cells will kill it.

Cancer cells are abnormal cells that become damaged that are not repaired or killed. They multiply rapidly to form a tumour or in blood cancers, outnumber the normal cells in the blood.

Cancer cells can also spread to other parts of the body, in a process called metastasis. Cancers that spread this way are more deadly as they are harder to treat.

What is QIMR Berghofer doing to fight cancer?

Cancer genetics

QIMR Berghofer researchers are involved in a range of projects to identify gene variations that increase the risk of developing cancer.

Working with scientists from around the world, QIMR Berghofer researchers are examining the DNA from cancer sufferers and their families and comparing this to healthy individuals to find the genes associated with disease.

Once identified, these genes help us to understand the way that cancer grows and spreads, and can potentially lead to genetic tests that can determine an individual’s risk of cancer.

Breast cancer tumour (purple) under a microscope

QIMR Berghofer’s cancer research covers:

- Blood cancers (including leukaemia, lymphoma and myelomas)
- Brain cancer (glioblastoma)
- Breast cancer
- Colorectal (bowel) cancer
- Endometrial cancer
- Melanoma
- Endocrine cancer
- Nasopharyngeal carcinoma (nose and throat cancer)
- Non-melanoma skin cancer
- Oesophageal cancer (including Barrett’s oesophagus)
- Ovarian cancer
- Pancreatic cancer
- Prostate cancer
- Stomach (gastric) cancer
A diagram of the immunotherapy process. First, blood and cancer antigens are collected from the patient. Immune cells are extracted from the blood, and cultured with the cancer antigens, which teaches the cells to target the cancer. The resulting anti-cancer immune cells are then injected back into the patient to attack the cancer.

“Cancer cells closely resemble healthy cells, and the immune system is often unable to distinguish one from the other, leaving the cancer to grow unchallenged.”

Cancer-causing lifestyle

QIMR Berghofer scientists are working to establish how different environmental factors such as diet and exercise can cause or contribute to cancer.

To do this, researchers collect information from a group of people in a certain area; surveying lifestyle habits and conducting regular health check-ups over many years. Scientists can then identify overall patterns that link specific behaviours with an increase or decrease in the incidence of cancer in these people.

This type of study has identified patterns of behaviour linked to cancer, such as:

- Using sunscreen daily can reduce the risk of developing melanoma
- Both obesity and reflux are significantly increase the risk of oesophageal cancer.

New treatments - cancer vaccines

QIMR Berghofer researchers have been developing a new type of treatment called immunotherapy, which uses the body’s own defenses to fight cancer.

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Immunotherapy treatment teaches immune cells to react to the abnormal cancer cells. Researchers extract both cancer and immune cells, activate the immune cells that react against cancer, and the inject the cells back into the patient.

This approach has been trialled with a range of cancers including glioblastoma with positive results. This treatment appears to have few side effects, unlike established treatments such as radiotherapy and chemotherapy.