

Victoria's leadership in medical research

DEPARTMENT OF BUSINESS AND INNOVATION



Victoria is continuing to build on its long-established international reputation for excellence in biomedical research, biotechnology and clinical trials.

Victorian researchers are focused on translating discoveries into improved health and quality of life and Victorian discoveries are already making a difference to the lives of millions of people worldwide. Victoria has been successful in securing over 40 per cent of national funding for health and medical research each year for the past 10 years.

Victoria is the ideal location for clinical trials in the Asia-Pacific region, with a first-class reputation for quality and integrity and extensive experience in conducting trials.

Recent Highlights

Cardiovascular disease

Retina reveals early signs of silent brain damage (August 2010)

Researchers at Melbourne's Centre for Eye Research Australia have discovered a non-invasive way to detect silent brain infarct or 'mini-stroke'. By looking at the blood vessels in the retina they found that those patients with abnormalities were more likely to develop mini-strokes during their 10 year study period. This potentially provides a screening test to predict damage before it would appear on MRI scans or cause clinical symptoms. It could be a way of advising patients that they need to take action on risk factors such as smoking or hypertension.

Women's cholesterol levels are higher than men's (August 2010)

The largest Australian study of cholesterol using general practitioner patient records made the surprising finding that women have higher cholesterol levels than men. The team at the Baker IDI Heart and Diabetes Institute analysed nearly 200,000 records and also found that four out of five middle-aged women present to their doctor with levels of the "bad" cholesterol or LDL (low density lipoprotein) outside the ideal range. These are concerning results considering the link between cholesterol levels and cardiovascular disease and they indicate that there could be two million adult women in Australia living with cholesterol levels above the ideal range.

A new drug to reduce the rate of heart failure (August 2010)

The Centre for Cardiovascular Research at Monash University has taken part in a trial of a new treatment which showed a 26 per cent reduction in death after heart failure. The treatment was tested in 6,000 chronic heart failure patients in 37 countries over four years. It acts to reduce the heart rate in patients by acting directly on the heart's natural pacemaker and is quite unlike current treatments with beta blockers. The study was described as a landmark in the treatment of chronic heart failure.

Cancer

Antibodies to cancer – a clinical trial (September 2010)

The Ludwig Institute for Cancer Research Melbourne – Austin Branch is a leading authority on the development of targeted antibodies and cancer vaccines. The Ludwig is currently undertaking a clinical trial of their latest treatment—an antibody against kidney cancer developed from their own research. The trial aims to determine the safety and effects of a new monoclonal antibody (cG250) when it is used to treat advanced renal cell carcinoma. The trial also uses Positron Emission Tomography imaging to observe any shrinkage or other changes in the tumour.

Cancer conundrum where treatment increases risks (August 2010)

A team from the Molecular Genetics of Cancer division of the Walter and Eliza Hall Institute looking at “programmed cell death” as a result of cancer treatment has turned current understanding on its head. This form of cell-suicide is thought to reduce the risk of cancer when cells are damaged. Their study on mice models showed that if the cell death was blocked, then the mice got fewer cancers. This suggested a new mechanism whereby cancer treatment can increase the risk of cancer by stimulating the stem cells to divide to replace the lost cells. These new findings will inform the on-going development of anti-cancer agents known as BH3 mimetics.

Obesity linked to breast cancer by hormones (July 2010)

The metabolism and cancer group at Prince Henry’s Institute has made a critical link between the production of the female hormone oestrogen in the fat tissue of obese women and their increased risk of developing breast cancer. Finding that factors in the fat tissue stimulate the local production of oestrogen in the breast opens the way to reduce the risk. Based on their findings they have started a clinical trial on Victorian women, using existing drugs to shut down local oestrogen production in the breast and thereby reduce the incidence of breast cancer.

Infectious Diseases / Immunology

HIV discovery – infection of “resting” immune cells (September 2010)

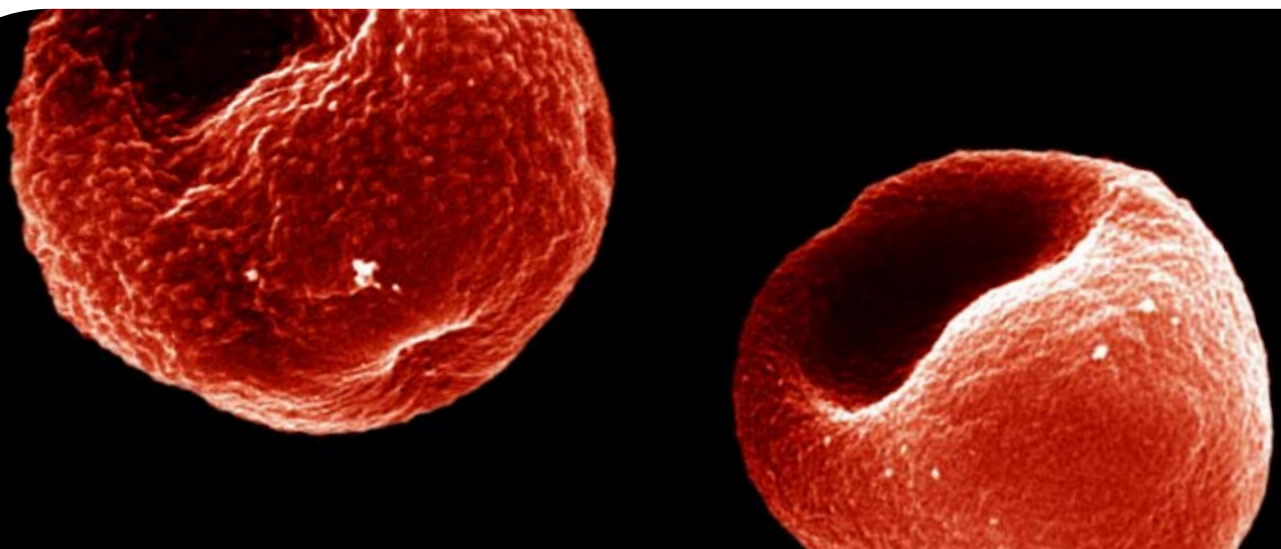
A research team at the Burnet Institute, Monash University and the Alfred Hospital has discovered how “resting” cells of the immune system are infected by the human immunodeficiency virus (HIV). They have identified a mechanism involving chemokines – the immune cells’ messaging system—which allows the virus to infect resting cells and then lie silent in these cells. The way the virus can lie hidden in resting cells, to emerge later and continue the infection, has been a major barrier to curing the disease. This discovery could help to clear this barrier. This study adds to previous research by the Burnet Institute and Monash University which identified that patients suffering from the dementia associated with HIV have extensive infection of particular brain cells known as astrocytes. These infected astrocytes constitute a previously unrecognised “reservoir” of virus.

Immune cells in fat tissue link obesity and diabetes (August 2010)

Recent findings by the Walter and Eliza Hall Institute have linked the presence of macrophages (a type of immune cell) in fat tissue to obesity and diabetes. In a study with Monash University the researchers looked at the fat tissue of 100 lapband surgery patients and found that the presence of macrophages in the fat tissue was closely linked with insulin resistance—a feature of diabetes. The team believes that the macrophages are releasing cytokines, chemical messengers that immune cells use to communicate, in an inflammatory or immune response. When the fat tissue disappeared so did the macrophages and the risk of diabetes, suggesting it may be possible to tackle diabetes with anti-inflammatory drugs.

New molecules to fight malaria (June 2010)

A new approach to fighting malaria infection has been discovered by the Walter and Eliza Hall Institute, in collaboration with the Burnet Institute. Their research showed that molecules similar to heparin (used to prevent blood clotting) can bind to the surface of red blood cells and block infection by the malaria causing parasite *Plasmodium falciparum*. They have identified molecules that are potent against the parasite and do not prevent blood-clotting. This opens up a new approach for anti-malarial drugs, which normally target the malaria parasite within the red blood cell.



Stem Cells

Placenta shows the ability to heal lungs (June 2010)

A team at the Monash Institute of Medical Research has used placental 'stem' cells to treat lung disease. The study used a mouse model of pulmonary fibrosis and showed for the first time that the human placental cells could differentiate into functional lung epithelial cells. The placental amnion cells reduced inflammation and lung damage while promoting healing. Chronic lung disease responds poorly to current treatments and placental 'stem' cells offer hope to develop a new mode of therapy.

Revolutionary microsurgery for breast reconstruction (June 2010)

A new process which will help cancer patients recover after breast surgery has been developed by researchers at the O'Brien Institute. The process combines microsurgery, cell biology and bioengineering to help patients regrow breast tissue from their own fat cells. During the breast reconstruction procedure a patient's own fat cells are isolated and implanted in a biodegradable chamber. They are then connected to her blood supply by microsurgery and the cells divide and grow to produce new fat in the shape of the chamber. This revolutionary technique could be applied to other injuries or defects that need new tissue growth for repair.

Causative 'stem' cells identified in childhood leukaemia (January 2010)

T cell acute lymphoblastic leukaemia is a common type of childhood leukaemia. A team at the Royal Melbourne Hospital and the University of Melbourne has discovered the cells that cause it. They found some cells in the thymus of mice that persisted after radiation treatment and which quickly recovered after treatment ended. These cells look like normal stem cells. Targeting ways to kill these cells may improve treatment and help to prevent relapse after treatment.

Neuroscience

Alzheimer's disease caused by brain cell 'rusting' (September 2010)

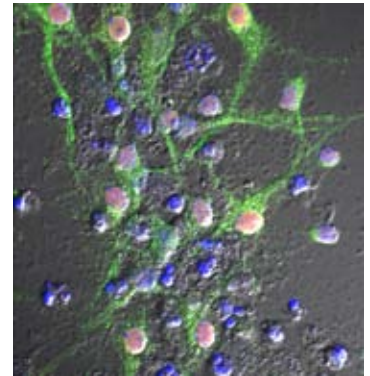
A major advance in understanding the cause of Alzheimer's disease has been made by researchers at the Mental Health Research Institute. The research team has found that the Amyloid Precursor Protein (APP)—which forms the characteristic plaques found in the brains of Alzheimer's sufferers—transports iron out of neurones. When this function is impaired, the neurones accumulate iron and its oxidative (rusting) effects are toxic. This APP protein function is blocked by zinc, but the block is reversed by removing the zinc. This work is the basis for a new class of drugs currently under development which works by binding the metal ions in and around neurones.

Osteoporosis and neurodegeneration (March 2010)

The Bone Cell Biology and Disease Unit at St Vincent's Institute has found a new way that bone formation is stimulated. Bone breakdown and bone formation are usually in balance but in conditions such as osteoporosis that balance is tipped towards bone breakdown. Working in mice they showed that a protein, Oncostatin M, can act to build up bone independently of the breakdown process. This provides a new avenue to develop treatment. The researchers believe that the process they have identified has implications beyond osteoporosis and may be relevant for neurodegenerative and cardiovascular conditions as well as cancer.

Cell based therapy protects auditory nerves

A recent collaborative study between the Bionic Ear Institute and Living Cell Technologies may improve the treatment of the cochlea in deaf patients. In deaf patients, the auditory nerves in the cochlea die off. However, they can be protected by neurotrophins—proteins that can signal to nerve cells to grow and to survive. The researchers implanted a bionic ear along with small capsules containing cells that secreted neurotrophins. They showed that using this method they could protect the auditory nerves from dying off in the deaf cochlea. This has the potential to be a new adjunct treatment in cochlear implant recipients.





Large Clinical Trials / Cohort Studies

START - STroke imAging pRevention and Treatment (September 2010)

A new collaborative research cluster has been launched to try and reduce the incidence of stroke. The START study aims to collect and analyse information from 200 stroke victims. It aims to integrate imaging and biomarker analysis to identify patients at risk of stroke and stroke recurrence with the eventual aim of developing preventative measures. The project is funded under the CSIRO's Preventative Health Flagship. Project partners also include the Florey Neuroscience Institutes, the University of Melbourne, the Royal Melbourne Hospital and Neurosciences Victoria.

International Cancer Genome Consortium and the Peter Mac (April 2010)

The Australian Ovarian Cancer Study is contributing its large patient and tumour resources to the International Cancer Genome Consortium—a group of researchers from 22 countries who are conducting large-scale studies on the genomes of various tumours. The study, which is led by the Peter MacCallum Cancer Centre, aims to sequence 150 paired ovarian tumours collected before and after treatment. They aim to identify the differences between the primary and recurrent tumours to identify the genomic factors which confer resistance to treatment. The study has been made possible by next generation DNA sequencing. The Peter MacCallum Cancer Centre, in collaboration with the Institute for Molecular Bioscience in Brisbane, has received \$27 million from the National Health and Medical Research Council to take part in the Consortium.

Clinical trials for alternative medicine (September 2009)

RMIT University and the Guangdong Provincial Hospital of Chinese Medicine signed a research collaboration agreement worth \$1 million to conduct two multi-centre clinical trials in Victoria, one on Chinese herbal medicine for chronic obstructive pulmonary disease and another for the effects of acupuncture for hay fever. The Division of Chinese Medicine at RMIT is an accredited World Health Organization (WHO) Collaborating Centre for Traditional Medicine. It provides consultancy to the WHO, as well as providing assistance to universities in developing countries to devise comprehensive traditional medicine training programs.

ASPREE - ASPirin in Reducing Events in the Elderly

The ASPREE study is a longitudinal, prospective, cohort study led by Monash University that aims to determine whether regular, low-dose aspirin affects health outcomes in elderly people. The study will recruit and follow 19,000 participants aged 70 years or older, examining them regularly over five years. Funded initially by a National Health and Medical Research Centre project grant of \$3.5 million, then by a \$3.4 million CSIRO Flagship Charter grant and more recently by \$50 million from the National Institutes of Health in the US, the ASPREE study will look at health outcomes including cardiovascular events such as stroke and heart attack. It will also determine neurological effects of aspirin, including any effect on cognitive decline, and whether aspirin has an effect on various cancers, such as bowel cancer.

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