



## SHOWCASING NEW SOUTH WALES BREAKTHROUGHS IN MEDICAL RESEARCH

### **Synthetic arteries bypass the immune system to mend broken hearts**

Synthetic vascular grafts are used in surgery for patients requiring a bypass following severe heart attack. Commonly, the body recognises the synthetic graft as 'foreign', and turns on the body's defence or immune system, which unfortunately results in the graft being rejected and failing.

To address this problem, PhD student Richard Tan and his team from the Heart Research Institute at the University of Sydney have developed synthetic vascular grafts coated with a molecule that tricks the body's immune system so that it does not reject the foreign graft.

*"We found that the surfaces of the graft act to regulate the immune system, promoting the production molecules that favour an anti-inflammatory state and reduce rejection. This was observed in two vascular grafting models that we produced. These findings may have significant implications for the long-term performance of synthetic vascular grafts"* Richard said.

Richard and his team hope their findings will lead to increased success rates for synthetic vascular grafts in patients, reducing the need for heart attack patients to have further major surgery.

### **Co-treatment to weed out chronic pain**

It is estimated that one in five Australians live with chronic pain. There has been increasing pressure to allow for the use of medicinal cannabis to aid in a range of chronic conditions, such as neuropathic (nerve) pain.

PhD student Nicholas Atwal from the Kolling Institute for Medical Research at the University of Sydney has tested the psychoactive component of cannabis, delta-9-tetrahydrocannabinol (THC), as an 'add-on' treatment to be used in conjunction with current neuropathic pain drug such as gabapentin.

*"Together THC and gabapentin act synergistically to reduce the chronic pain symptoms in a model of neuropathic pain"* Nicholas said, *"THC represents a potential adjuvant in the treatment of neuropathic pain"*.

These results have exciting implications for the use of medicinal cannabis in the treatment of chronic pain.

### **Cloudy with a chance of vision: a drug-based treatment for cataract?**

Cataract is the leading cause of blindness in the world, but currently the only treatment is surgery that replaces the cloudy lens with an artificial clear lens. PhD student Daisy Shu from the Bosch Institute and Save Sight Institute at the University of Sydney is working under the guidance of Professor Frank Lovicu to address this problem.

Daisy's research explored a signalling pathway implicated in the spread of cancer and found that it may also lead to the formation of cataract. When the pathway was inhibited using anticancer drugs, it prevented the cells in the lens from forming cataracts.

*“Our research highlights a novel compound that prevents lens cells from forming cataracts, showing promise in the development of a drug-based treatment for cataract”* Daisy said.

### **A three-pronged approach to destroy brain cancer**

In Australia, brain cancer kills more children than any other disease and more people under 40 than any other cancer. People with brain cancer have only a 20% chance of surviving more than five years after diagnosis. Treatment usually involves radiotherapy, chemotherapy and surgery, but these methods only act as palliative care.

Dr Sianne Oktaria from the Centre for Medical Radiation Physics and the Illawarra Health and Medical Research Institute at the University of Wollongong, has developed a new ‘three-pronged’ method called indirect radio-chemo-beta therapy to destroy brain cancer cells. This new therapy combines the power of optimised X-rays beams with two drugs that stop the growth and repair of tumours, these drugs also make them more sensitive to radiation.

*“This method destroys more than double the number of brain tumour cells compared to radiation therapy alone, or when either drug and radiation therapy is combined”* Sianne said, *“In theory, this method could maximise the number of tumour cells killed, while sparing the healthy tissue”*.

Interview and photo opportunities available

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