

# LuminesCent



**Welcome** to the October 2008 issue of *LuminesCent*, wrapping up a very busy and exciting year for the Centenary Institute.

Many of our scientists have achieved strong results in their research throughout the year. In this edition we feature two, Dr Mika Jormakka (page 1) and Associate Professor Chris Semsarian (page 5), who had their work published in highly respected international journals.

One of our promising young researchers, Dr Jeff Holst, of the Gene and Stem Cell Therapy program, talks about his investigations into prostate cancer, the most common cancer diagnosed in Australian men, on page 4.

The Centenary Institute recently unveiled a confocal microscope that produces 3D images and video for improved investigation of diseases such as cancer and heart disease. Read about it on page 2.

Finally, I hope you enjoy the new-look *LuminesCent* reflecting our new logo and creative direction.

Best wishes for the summer months and holiday season.

**Erin Sharp, Editor**

*Dr Mika Jormakka hopes to improve treatments for diseases like cancer by mapping complex structures called membrane proteins.*

## Discovery first step to new therapies

In an Australian first, scientists at the Centenary Institute have mapped the anatomy of a membrane protein. This exciting discovery has the potential to turn the way we discover new drugs on its head and reduce the development time for new treatments.

"These membrane proteins are the target for 70% of all therapeutic drugs so an increased understanding of them is vital for future drug discoveries," said Centenary Institute Executive Director, Professor Mathew Vadas.

Publishing in the prestigious international journal, *Nature Structural & Molecular Biology*, Dr Mika Jormakka, head of Centenary's Structural Biology laboratory, says understanding membrane protein structures will help develop better treatments for some of Australia's biggest killers such as cancer.

Dr Jormakka explains: "The best way to imagine the way we currently discover new drugs is to think of a lock and key. The lock is the membrane protein that causes the body to respond to treatment and the key is the drug."

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### Discovery first step to new therapies

"Up until recently we have never known what the lock looked like so we have to build thousands of keys (drugs) until we stumble upon one that fits. By mapping membrane proteins we are creating a map of the locks – this should make it much easier to design a key that fits."

Dr Jormakka is widely recognised as a leader in the field and is now working on mapping membrane proteins that reduce the effectiveness of cancer chemotherapy drugs and antibiotics.

"By understanding how these membrane proteins work, we have the potential to eliminate the trial and error nature of patient treatment and to create targeted therapies to improve outcomes for patients."

## Foundation launches

On October 28, the Centenary Institute will formally launch our Foundation. Chaired by Board Governor Neil Lawrence, the Foundation aims to increase the profile of Centenary and raise money in support of its work. As the Executive Creative Director of Australia's largest advertising group, STW Group, Mr Lawrence brings enthusiasm and expertise to the Foundation.

If you would like more information on the activities of the Centenary Institute Foundation please contact Sally Castle, Marketing & Fundraising Manager, on 1800 677 977.

## 3D view gives further insight to disease



*PhD Scholar, Ben Roediger, using the new confocal microscope.*

The Centenary Institute recently installed our new confocal microscope – a vital addition to our facilities that will give our researchers further insight to how diseases develop.

The confocal microscope is used for imaging cells and tissues. It allows researchers to investigate dynamic cellular processes over time via high resolution 3D images and videos.

This exciting new facility will help scientists to understand and model how the body functions when healthy or diseased. The high resolution microscope produces much clearer images and allows for a 3D reconstruction of cells and tissues.

It will further enhance our research into many health issues facing Australians, including cancer, heart disease, tuberculosis, juvenile diabetes, childhood asthma, MS and organ transplantation as well as accelerating the pace of research at Centenary.

# Research update

## A future of possibilities in stem cell research



*Professor Donald Metcalf and Professor John Rasko at the opportunities in stem cell biology colloquium.*

Research on adult stem cells is an exciting area of investigation. It has the possibility to help cure or treat a myriad of serious diseases such as cancer and heart disease.

In June this year, the Centenary Institute hosted a one-day colloquium looking at the opportunities of stem cell biology.

The speakers throughout the day featured a who's who of stem cell research in Australia including Professor John Rasko, Professor Jenny Gamble and Dr Nick Shackel from Centenary. The speakers outlined the challenges involved in maintaining stem cells in vitro and their potential for tissue and organ regeneration.

One of the day's highlights was the presentation by Professor Donald Metcalf

of the Walter and Eliza Hall Institute of Medical Research, who has been at the cutting edge of stem cell research in Australia for many decades.

Centenary's Executive Director Professor Mathew Vadas says the impact adult stem cell research could have on the health of the community is truly diverse.

"Adult stem cells have proven highly successful in bone marrow transplants," says Professor Vadas. "We now believe adult stem cells are also found in other organs and tissues including the brain, blood vessels, skin and liver. Stem cells have the ability to turn themselves into many different types of cells. If we can find out how they do this, we could apply this knowledge to finding cures and treatments for diseases."

The successful colloquium was co-hosted by the NSW Stem Cell Network and sponsored by Invitrogen, Millipore, Stem Cell Technologies and HD Scientific Supplies.

This will be followed by a seminar in October by Professor Alan Trounson, who has recently taken over as President of the California Institute for Regenerative Medicine (CIRM) in San Francisco. Professor Trounson is a pioneer in the area of stem

cell biology and is one of the major international opinion-makers about the clinical potential and ethical use of this technology. At the CIRM he oversees an annual budget of \$300 million for research in this area.



*Centenary's Dr Nick Shackel addresses the colloquium.*

# Researcher Profile

Despite his high school chemistry teacher telling him he would never be a scientist, Dr Jeff Holst pursued his dream of making a difference to the lives of others through medical research.



Now a decade into what is a highly successful career, Dr Holst remains committed to improving the health of all Australians through scientific discovery.

Dr Holst undertook his PhD at St Vincent's Hospital in Sydney before heading overseas to the prestigious St Jude's Children's Research Hospital in the United States to study the immune system.

A desire to tackle cancer research and return to his family bought Dr Holst home to join the Centenary Institute's Gene and Stem Cell Therapy program under Professor John Rasko in 2006.

## Describe your current research and the impact it could have on community health

I am currently working on two different areas. Firstly, we want to understand how to grow stem cells outside the body so they retain their ability to make many other types of cells.

Success in this challenging area of research has the potential to help cure disease. For example, we know blood diseases like haemophilia are caused by a single missing gene. If we can genetically modify cells, we may be able to use these 'gene therapies' to cure serious human diseases.

My second focus is on how prostate cancer cells increase their nutrient supply and thereby allow the cancer to grow.

Cancer cells need more nutrients than cancer-free cells to grow. To get more nutrients to the cells they increase their ability to pump these nutrients into cells. We want to find out how to block these pumps so prostate cancer cells can't get the nutrients they need to grow – effectively starving the tumour. I hope this will lead to better treatments for prostate cancer patients.

## What is your career highlight to date?

Working at St Jude's in the USA. The sheer size of the operation really is something special – you don't have to leave the building for anything. The pace of the research is amazing. If you need something, you can order it and it arrives the next day. Here in Australia, because of our location, it can sometimes take up to a month, maybe more. It just gives you a different perspective.

## Why did you join the Centenary Institute?

We had always planned to return to Australia. Sydney is home and my wife and I wanted to be closer to family.

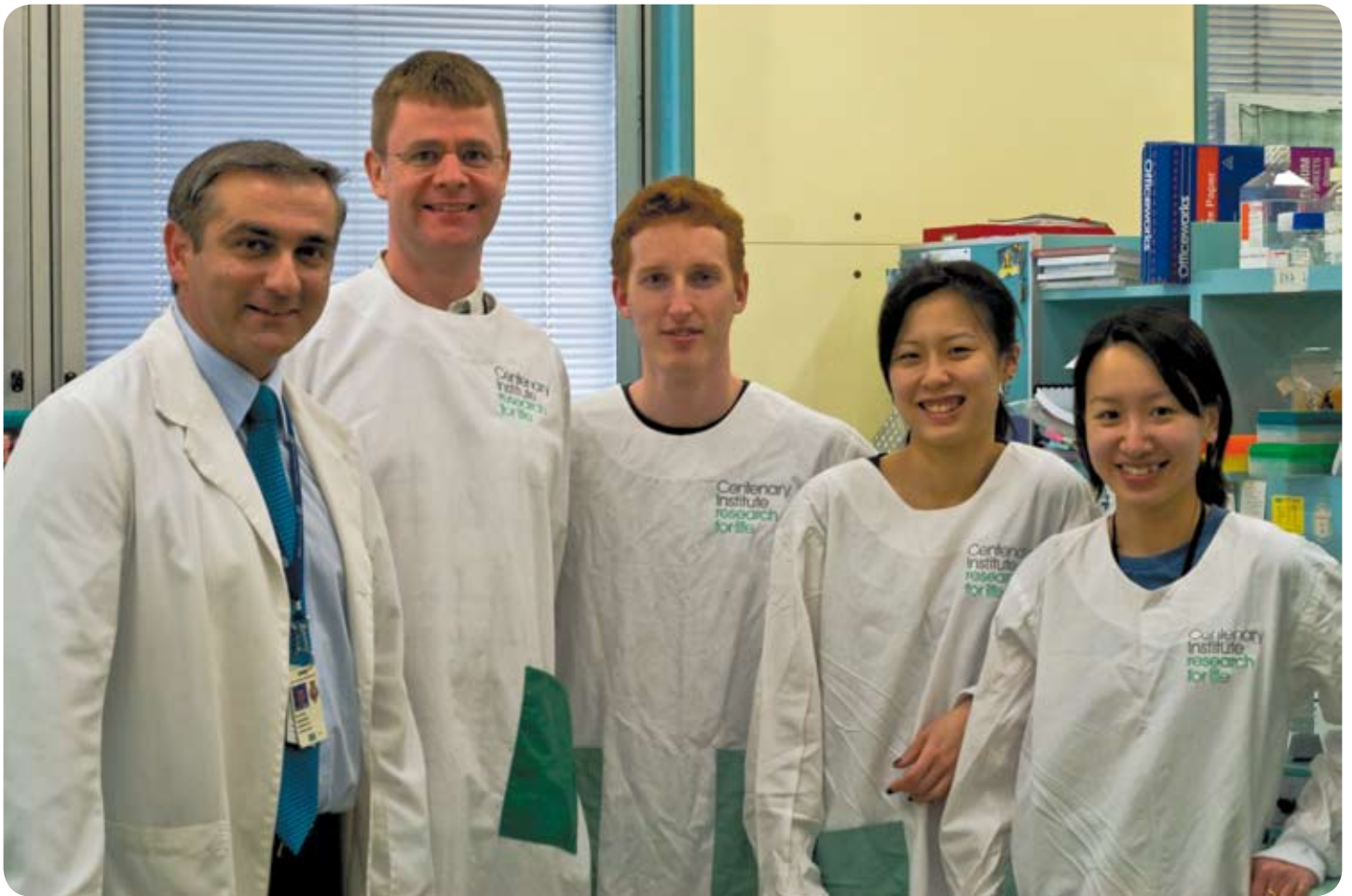
The opportunity offered by Professor Rasko at Centenary was also too good to refuse. I was keen to move from immunology to cancer research. Like so many of us, my family has been touched by cancer, and I had always wanted to work in that area.

Centenary presented the right opportunity at the right time!

## What do you love most about working at Centenary?

The people. Our laboratory is a great bunch – fun to work with and a really good team.

Plus the opportunity to be mentored by Professor Rasko. He is different to my other mentors. He is a clinician as well as a scientist, so he brings a different perspective to the importance of medical research and its impact on patients. We do what we do because we want to improve people's health and it is important to always remember that.



Associate Professor Chris Semsarian, Richard Bagnall, Matthew Kelly, Ju-En Tan and Emily Tu in the Molecular Cardiology laboratory.

# CENTENARY INSTITUTE BREAKTHROUGH SHEDDING LIGHT ON THE CAUSE OF CHRONIC HEART FAILURE

Centenary Institute researchers have made a breakthrough discovery into the cause of chronic heart failure, linking a double gene mutation with a significantly increased risk of disease development.

The important discovery, published in the premier international cardiovascular disease journal *Circulation*, will have implications for determining patient risk and developing improved treatments for those living with severe heart failure.

Associate Professor Chris Semsarian, Head of the Agnes Ginges Molecular Cardiology laboratory explains that previous investigations focused on single gene mutations that lead to disease, but his team's work is the first to successfully

determine the impact of double gene mutations in familial cardiomyopathies.

"We felt the single gene mutations weren't accounting for the overall risk of a patient developing heart failure," says Associate Professor Semsarian. "We decided the key questions were: what happens when there is more than one genetic problem and what impact does this have on patient outcomes?"

"We developed a unique model and found the double-gene mutation invariably led

to severe heart failure and early death. This goes some way to answering the question of why some people have a greater risk of developing severe heart failure than others."

Associate Professor Semsarian hopes the discovery will enable doctors to more accurately assess a patients' risk of developing heart failure, which affects one in 10 Australians aged over 65. This provides a unique opportunity to initiate prevention strategies earlier.

Additionally, the discovery provides a platform for further investigation into treatment options for sufferers of heart failure.

"We now have a model of severe heart failure that develops very quickly. This presents enormous potential for the development of better treatments and that is the next exciting step for our research," Associate Professor Semsarian says.

# AGM Celebrating a prosperous year



Centenary Institute Chairman, The Hon Michael Egan; then Minister for Science and Medical Research, The Hon Verity Firth; and Centenary Executive Director, Professor Mathew Vadas, at the recent AGM.

In August, the Centenary Institute's Board of Governors, special guests, generous donors and dedicated staff gathered at the Annual General Meeting to reflect on an incredibly successful year.

The Centenary Institute was honoured to welcome the then NSW Minister for Science and Medical Research, The Honourable Verity Firth, Nobel Laureate for Medicine, Professor Peter Doherty, and new University of Sydney Vice Chancellor, Dr Michael Spence, to talk about the future of medical research in Australia.

Minister Firth congratulated the Institute on an impressive year of growth and scientific achievement and outlined the NSW Government's commitment to medical research. She also acknowledged the immense difference medical research can make to the health of all Australians.

Professor Doherty discussed the importance of independent research institutes to drive scientific advances. He emphasised how partnerships with hospitals and universities are crucial in order to translate scientific discoveries to benefits for patients and the community as a whole.

Dr Spence highlighted how a strong collaborative partnership between the University and the Centenary Institute will further enhance the quality of research.

In reflecting on a prosperous year, Centenary Institute Executive Director,

Professor Mathew Vadas, highlighted some of Centenary's major achievements for 2007, including:

- The recruitment of scientific leaders to head up the new laboratories: Immune Imaging (Professor Wolfgang Weninger); Structural Biology (Dr Mika Jormakka); Signal Transduction (Associate Professor Pu Xia); and Vascular Biology (Professor Jenny Gamble).
- Further development of important collaborations, including the comprehensive cancer centre project in partnership with the Sydney Cancer Centre.
- The new-look Centenary Institute logo, brand and creative campaigns reflecting a renewed commitment to communicating our work.

Three of Centenary's scientists were also honoured for the publication of their discoveries in prestigious journals. The awards for Professor Barbara Fazekas de St Groth (autoimmune diseases), Associate Professor Chris Semsarian (heart disease) and Dr Chris Jolly (cancer) underline the importance of the work being undertaken by scientists at the Centenary Institute.



Nobel Laureate for Medicine, Professor Peter Doherty, stresses the importance of independent research institutes at our recent AGM.

**1 IN 3 AUSTRALIANS GET CANCER**  
**1 IN 3 AUSTRALIANS DIE OF HEART DISEASE**  
**1 IN 4 OF OUR CHILDREN WILL GET ASTHMA**  
**2 BILLION PEOPLE ARE INFECTED WITH TB**

**YOUR BEQUEST** could make all the difference

Please contact Sally Castle, Fundraising Manager on **1800 677 977** to discuss how your will can help the Centenary Institute find cures for these devastating diseases.

Helping all Australians live longer, healthier lives

[www.centenary.org.au](http://www.centenary.org.au)



# AWARDS AND ACHIEVEMENTS

Congratulations to Dr Ryuichi Aikawa who was recently awarded a three-year, \$300,000 grant from the University of Sydney Medical Foundation. Dr Aikawa is hoping to develop gene therapy treatments for patients with severe heart disease. Dr Aikawa recently joined the Centenary Institute as a member of the Gene and Stem Cell Therapy program.

The Centenary Institute's young researchers and students have been recognised for their hard work and dedication.

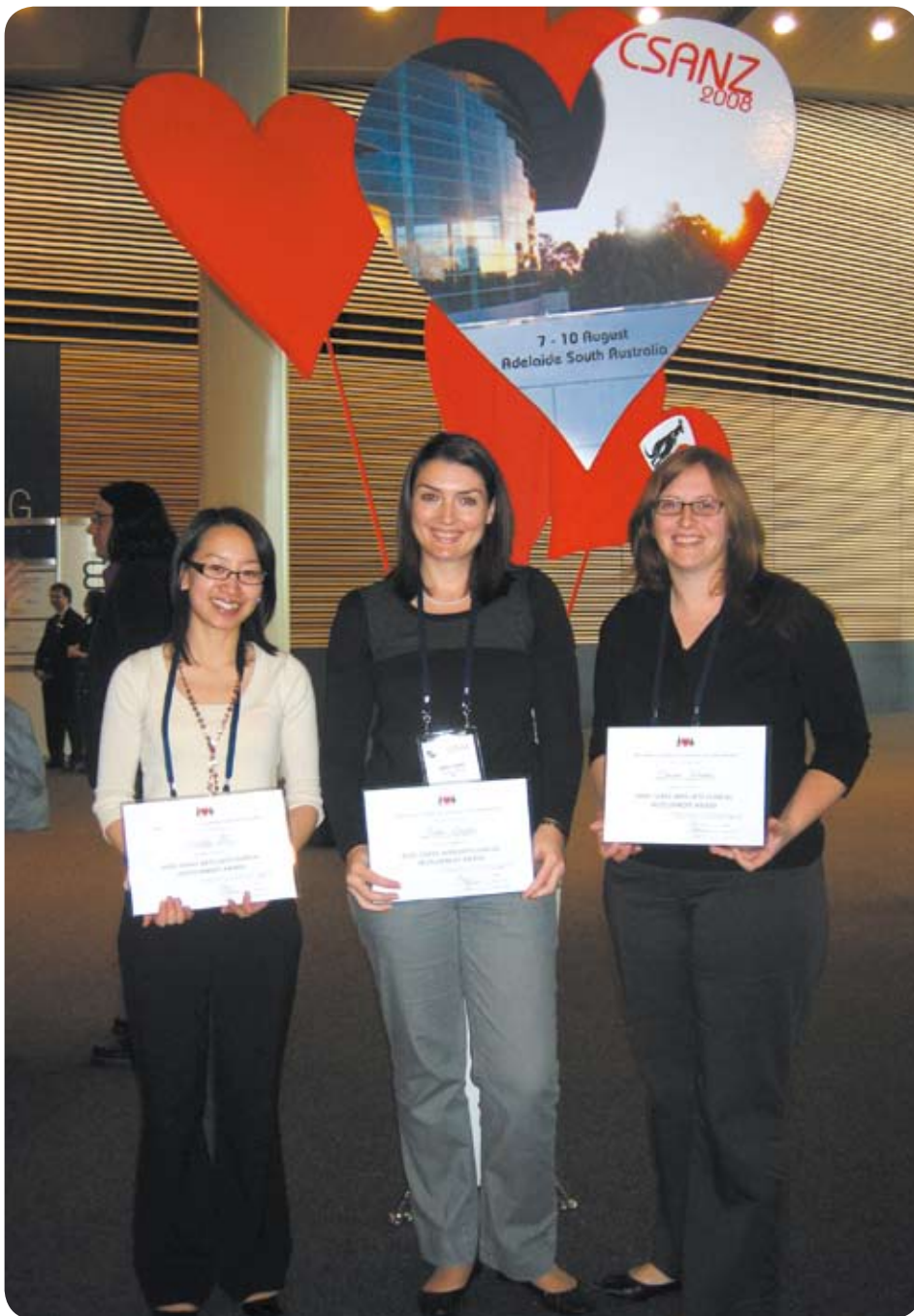
Congratulations to the Centenary Institute's Molecular Cardiology lab, who recently swept up four awards at the Cardiac Society of Australia and New Zealand's Annual Scientific Meeting.

PhD Scholar, Lien Lam, was runner up in the Australian category of the International Society for Heart Research Young Investigator Award for her work in genetic heart disease.

Not content for Lien to take all the glory, fellow lab members Jodie Ingles, Emily Tu and Laura Yeates were presented with three out of the six possible Career Development Awards. Impressive!

At the Australian Centre for HIV & Hepatitis Virology Research meeting in June, Lauren Holz, PhD scholar in the Liver Immunobiology group, was awarded the Young Investigator Prize for her work on hepatitis C. Well done Lauren.

Vascular Biology's Jennifer Young, a PhD scholar, has been granted a Commercialisation Training Scheme Scholarship to complete a Graduate Certificate in Innovation & Enterprise. Congratulations Jennifer.



Emily Tu, Jodie Ingles and Laura Yeates with their Career Development Awards, awarded at the Cardiac Society of Australia and New Zealand's Annual Scientific Meeting.

## Say thanks to Centenary's brilliant researchers

"Thank You"  
Day

November 29 is Thank You Day – your opportunity to thank the Centenary Institute's dedicated researchers who work day in and day out to help all Australians live longer, healthier lives.

Simply write your message on the enclosed 'Thank You' card and post it back in the Reply Paid envelope to Reply Paid 83998, Newtown NSW 2042.

Your messages of support will provide encouragement to our scientists as they continue their life-saving medical research.



## Message from the Director

Unlike the stock market, the influence of financial turmoil on medical research is slow, but increasingly palpable.

Nevertheless these tumultuous times provide their opportunities and their challenges.

The opportunity to recruit talented scientists has never been greater; and I am pleased to report the appointment of a truly outstanding individual to the Wenkart Chair of the Endothelium, who will be joining us from Vienna.

Historically these are also the times when students turn to study science at the expense of the more commercial courses at our universities.

On the other hand, the Centenary Institute is growing quite rapidly – we are now 170. Our need for funds to support our staff and our new recruits is also rising, making your steady support at these times even more crucial than ever.

Luckily our rate of discoveries has not slowed and wonderful progress is being seen through Dr Mika Jormakka and Associate Professor Chris Semsarian's work featured in this issue of *LuminesCent*.

In addition through the generosity of Singleton Ogilvy & Mather and

ZenithOptiMedia, our publicity campaign has had a wonderful start on television and print and will shortly appear online.

We remain focused on making clinically important discoveries in cancer, cardiovascular and infectious diseases.

Your continued support allows an uninterrupted pursuit of this quest.

Professor Mathew Vadas

## Launching our new creative campaign

The Centenary Institute launched our new advertising campaign which was generously created free of charge by Singleton Ogilvy & Mather, with the support of Plush Films, the Tait Gallery, Bean Colour, Song Zu, Pulse Foods & Health and St Ignatius College.

Placement of the ads is kindly being arranged by Geoff Dixon and ZenithOptiMedia. At the time of printing, they have secured the generous support of Channel 7, Channel 9, Channel 10, Fairfax, MCN (the Multi Channel Network) and News Limited.

Today I dropped the kids off at school, worked three hours from home, did four loads of laundry and helped discover a double-gene mutation linked to heart failure.

Whatever you do each day, now you can also make a real difference to finding cures for the diseases that affect us most – including cancer, heart and infectious diseases. Centenary Institute works closely with Sydney University and Royal Prince Alfred Hospital to help all Australians live longer, healthier lives. You can do your bit at [centenary.org.au](http://centenary.org.au)

**Centenary Institute**

[www.centenary.org.au](http://www.centenary.org.au)

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