

LuminesCent



Professor Barbara Fazekas de St Groth, Head of T-Cell Biology group

Exceptional research recognised by national funding body

Centenary researchers have again performed extremely well in the recent National Health and Medical Research Council (NHMRC) grant announcements, receiving over \$11 million in funding.

Professor Mathew Vadas, Executive Director of the Centenary Institute says, "These highly sought after grants will be a tremendous help to Centenary researchers as they seek to answer the big questions surrounding cancer, cardiovascular disease and infectious diseases."

NHMRC Grants are amongst the most prestigious funds an Australian researcher can receive, as the Council has one of the most competitive peer review processes in Australia.

The quality of Centenary's research programs is highlighted by its project grant success rate which is nearly twice the national average.

Professor Vadas says, "Such prestigious funding from the NHMRC speaks of the high impact work that our scientists are doing to ensure the health of our global community for generations to come."

"I am especially proud of the work of the Mycobacterial group, who received 4 grants for their research into enhancing the body's natural defenses against tuberculosis, and the Molecular Cardiology group, who received 3 grants for their research into sudden cardiac death and inherited cardiomyopathies."

"I am truly privileged to be part of such a committed group of researchers whose passion and commitment to their work is unending, and I am pleased that our peers believe so highly in the skills of our researchers." (See recipients on pg 3)

Centenary brings a healthier outlook to expectant mothers

Researchers in Sydney have made a scientific breakthrough concerning preeclampsia, an age-old condition that has troubled expectant mothers for years. The discovery reinforces the startling theory that preeclampsia might involve the rejection of the fetus by its mother's immune system.

Published in the highly accredited *Journal of Immunology*, the paper explains for the first time that a small population of immune cells called Regulatory T-cells might play an important role in preventing rejection during normal pregnancy.

Preeclampsia is a leading cause of complications and even death amongst pregnant women in Australia. It is the country's most common serious medical disorder in pregnancy, affecting 5-10% of expectant mothers. Yet the causes of this illness remain a mystery and apart from delivering the baby, there is no known cure.

Continued page 2...

Centenary
Institute
research
for life



This discovery is the result of collaboration between Centenary Institute's Professor Barbara Fazekas de St Groth and University of Sydney Medical School Professor Ralph Nanan.

Both Professor Nanan and Professor Fazekas hope that this finding will enable doctors to reduce the effects and severity of preeclampsia. This could lead to improved outcomes for patients like Carley Payne, who developed the condition during her first pregnancy, forcing her to deliver her son Dylan at only 25 weeks.

"I remember being so scared. I just couldn't think straight. I had no control over anything and I didn't really know what was going on" said Carley.



Carley and her son Dylan

"After Dylan was born, he had to stay in the hospital on oxygen and in a humidicrib for three months. It was two weeks before I even got to hold him. He almost died twice. I was worried about Dylan, it was such an emotional time."



Dylan Payne

Preeclampsia is an illness that only occurs in pregnancy, most commonly arising during the second half of the gestation period. It can cause multiple problems, such as high blood pressure, kidney failure, leakage of protein into the urine, thinning of the blood, liver dysfunction and occasionally, convulsions.

The baby of a preeclamptic mother may grow slower than normal in the womb or suffer a potentially harmful oxygen deficiency. Often the baby has to be delivered prematurely to avoid serious complications which would threaten the life of the baby and the mother.

In addition, due to healthcare costs and long-term care for disorders linked to premature birth, this condition causes an annual global financial burden estimated to be in the billions of dollars.

Professor Nanan and Professor Fazekas studied the Regulatory T-cell levels of pregnant mothers at the time of delivery and compared them with those of mothers who had preeclampsia.

"What we found is that in healthy pregnancies there was an increase in Regulatory T-cell production and a decrease in the production of cells that cause inflammation. Patients with preeclampsia however did not experience these normal immune adaptations to pregnancy," said Professor Nanan.

Professor Fazekas explains, "Fifty years ago researchers hypothesised that preeclampsia is caused by the immune system's inability to generate proper tolerance to the baby but it has been very difficult to prove. Our research reinforces the belief preeclampsia is initiated, at least in part, by an immune mediated problem that leads to an increase in inflammation."

"Each person has a set of transplantation antigens that are on all cells and are unique to that person. Normally, the immune system will reject anything that has foreign antigens. Pregnancy is therefore an interesting phenomenon, because the mother's body normally accepts the fetus even though the baby gets half of its antigens from the father, which would usually register as foreign to the mother's immune system."

"We found that the changes in the balance between Regulatory T-cells and inflammatory T-cells in pregnancy may be crucial in stopping the mother's immune system from rejecting the baby. In preeclampsia, when these changes do not occur, both the baby and the mother are put at risk."

According to Professor Fazekas, "We still have a long way to go to make preeclampsia a condition of the past, but we have opened up a new way of looking at the illness which could lead to new diagnostics and therapies, meaning healthier mothers and babies."

Young Scientists on a Fast Pace Discovery

One of the Centenary Institute's up-and-coming young scientists recently accomplished the magnificent feat of crystallising a protein in less than twenty-one days.

The protein the student mapped is critical to a number of strains of bacteria that can infect humans - particularly in the gastrointestinal system where bacteria can cause gastroenteritis. The map of the protein's structure is a vital first step in dramatically reducing the time it takes to develop new drugs that can be used to treat these infections.

The second year PhD candidate's results are impressive as the crystallisation process can often take years. The student is quick to add that collaboration with first year PhD candidate Amy Guilfoyle helped to accelerate the pace of her research.

"Some of it has to do with luck, as proteins can be very unpredictable. A large part of my success was due to Amy first establishing a protocol for a similar protein which I could follow. This eliminated a lot of trial and error."

Mapping proteins is no simple task as they are so small that scientists are unable to view them through a microscope. To determine the shape of the protein the young scientists used a technique called x-ray crystallography. In this process, a beam of X-rays strikes a crystal

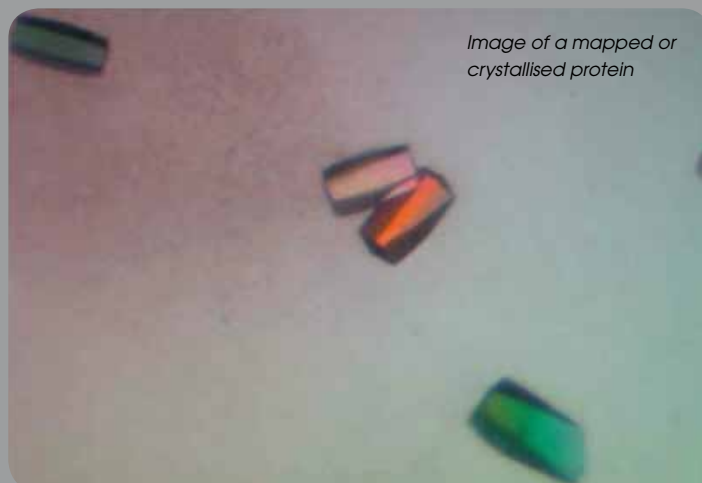


Image of a mapped or crystallised protein

and diffracts into many directions. Researchers then use the angles and intensities of these diffracted beams to interpret a 3D structure.

The student explains, "It's like throwing a ping pong ball at an invisible car. You're not able to see the car, but each time the ball bounces off the structure of the car you can make out the shape by where it hits."

Executive Director of the Centenary Institute, Professor Mathew Vadas, remarks, "The work of these young scientists exemplifies the core theme of collaboration that Centenary prides itself on as the key to its success. Our talented scientists continue to embrace the opportunity to work together to achieve the best results in their fields."

Centenary Institute Foundation Cocktail Reception

In October, Centenary held its second Annual Foundation Cocktail Reception at Government House. The event was a perfect start to spring, as the wonderful food, music and even weather all added to a pleasant evening enjoyed by Centenary's guests.



Keynote speaker Professor Jenny Gamble, Guest of Honour Professor Jim Bishop and Executive Director Professor Mathew Vadas

Throughout the night attendees had the opportunity to meet some of the Institute's brilliant young scientists who are making groundbreaking discoveries in the fields of cancer, cardiovascular and infectious diseases.

A highlight of the evening included Guest of Honour Professor Jim Bishop AO, Australia's Chief Medical Officer, who spoke about the importance of medical research to global community health. His speech was followed by a presentation from keynote speaker, Head of the Vascular Biology group at Centenary, Professor Jenny Gamble, who discussed her lab's investigation into the process of blood vessel formation and survival.

All proceeds from the night helped to fund a Bioinformatics Fellowship. This important position will provide Centenary with a dedicated specialist who can help to interpret and make sense of the vast amounts of data generated by modern medical research, accelerating the pace of our research across all of our labs. At our recent strategy meeting, our scientists unanimously agreed that a Bioinformatics Fellow is the Institute's highest need.

If you would like to join us in our research for life by helping to fund this vital position please contact Sally Castle on 1800 677 977

AWARDS AND ACHIEVEMENTS

In honour of their recent achievements, Centenary wishes to congratulate the following scientists:



Professor Chris Semsarian, Head of the Molecular Cardiology group, for winning the 2009 RPA Foundation's Research Medal for excellence in medical research, along with a prize of \$50,000.

Professor Chris Semsarian, Head of the Molecular Cardiology group

PhD candidate Jonathan Nambiar, who received the honour of representing Australia at the Novartis International Biotechnology Leadership Camp.



Jonathan Nambiar from the Mycobacterial group

Executive Director Professor Mathew Vadas for receiving the AVBS Distinguished Lecturer Award for his work as a spokesperson for Vascular Biology and for his extensive research on angiogenesis and sinensis.

NHMRC grant recipients:

Professor Chris Semsarian, Dr Jamie Triccas, Dr Bernadette Saunders, Professor Warwick Britton, Dr Nick Shackel, Professor Wolfgang Weninger, Dr Miika Jormakka, Dr Megan Maher, Dr Tatiana Tsoutsman, Professor Barbara Fazekas de St Groth, Professor Geoff McCaughan, Associate Professor Mark Gorrell, Dr Charles Bailey, Dr Fiona Warner, Professor Pu Xia, Dr Patrick Bertolino, Professor Jenny Gamble and Professor Mathew Vadas.

Cancer Institute NSW grant recipients:

Professor Pu Xia and Dr Tim Cheung.

Prostate Cancer Foundation of Australia grant recipients:

Professor John Rasko and Dr Rosetta Martiniello- Wilks

Gastroenterological Society of Australia grant recipient:

Dr Fiona Warner



Director's Message

It is gratifying to see that our Institute has grown to double its size in research income and staff numbers in the past three years. This growth has been paralleled by a research output that is not only of the highest quality but also has relevance for the prevention and treatment of diseases.

By working together, our staff has withstood the financial turmoil of the last few years and is now planning for our next phase of growth in partnership with the University of Sydney, Royal Prince Alfred Hospital and LifeHouse.

We have initiated a new Laboratory of Bioinformatics that will bring the development of skills in information management to the priority it deserves. We are also in the process of finalising the

Chair of the Endothelium, a position that will cement our leadership in cardiovascular research.

In an exciting development, the University will soon begin the construction of a substantial research centre, which will be joined with our current building. This expansion will put the Centenary at the centre of one of the strongest research environments in the world.

Finally, I thank Professor Geoff McCaughan whose term as Centenary's Assistant Director has finished. His work and dedication have been central to the Institute's success in the last two years. I also extend a warm welcome to Professor Chris Semsarian who begins his two-year tenure as Assistant Director this year.

Professor Mathew Vadas

CENTENARY WELCOMES

Centenary is pleased to welcome Dr Sue Pond to the Board of Governors

Dr Pond has a strong scientific and commercial background having held executive positions in the biotechnology and pharmaceutical industry for 12 years. Dr Pond has a Bachelor of Medicine and Surgery (Hons 1) degree from the University of Sydney, a Doctor of Medicine degree from the University of New South Wales and Doctor of Science and Doctor of Medicine honoris causa degrees from the University of Queensland. She has specialist clinical credentials in internal medicine, clinical pharmacology and clinical toxicology.



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



Centenary Institute

www.centenary.org.au

Locked Bag 6, Newtown NSW 2042 P 02 9565 6100 F 02 9565 6101 E enquiries@centenary.org.au
Editorial: LauraBeth Albanese Print Management: Morprint

